PRICE LIST

OF

ENGINES AND THEIR ACCESSORIES,

MACHINERY,

TOOLS, AND STORES,

FOR

MINING, QUARRYING, AND DRESSING OF ORES.

CHRISTOPHER SEARCH AND CO.,

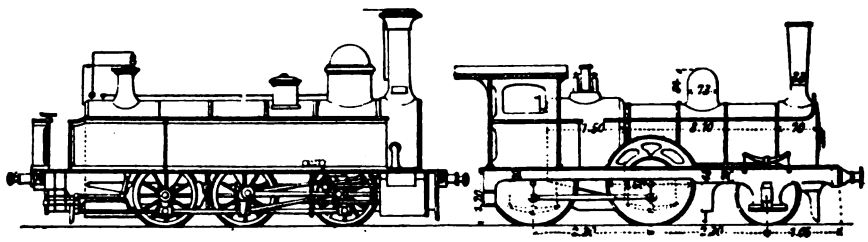
ENGINEERS,

16, CRAVEN STREET, CHARING CROSS,

LONDON.

TANK LOCOMOTIVES,

FOR MINERAL LINES.



The following Prices of Tank Locomotives are for Engines of the best construction, both as regards design, workmanship, and materials, and they can be confidently recommended to the notice of Colliery Proprietors and others requiring Locomotives for use on short lines of rail.

No.	Diameter of Cylinder.	Length of Stroke.	Indicated H.P.	Number of Wheels.	Diameter of Wheels.	Gross Weight.	Draught.	Total Heat Surface.	Grate Area.	Length of Barrel.	Diameter of Barrel.	Tubes.	Capacity of Tank.	Price.
	inches.	inches.			inches.	tons.		feet.	feet.	inches.	inches.		gallons.	£
1	6	12	40	4	24	6	120	120	2½	64	27	50 × 1½	150	500
2	7	12	70	4	30	7½	160	162	3½	70	27	50 ,, 1⅝	200	650
3	8½	15	100	4	30	10½	240	233	5	80	33	52 ,, 2	250	790
4	10	15	140	4	36	12½	280	333	6	86½	36	80 ,, 2	300	900
5	10	18	150	6	36	13	280	333	6	86	36	80 ,, 2	300	1000
6	11	18	200	4	36	13	330	399	6½	87	36	90 ,, 2	400	1000
7	11	20	200	6	36	15	330	399	6½	90	36	90 ,, 1⅞	400	1200
8	12	20	280	4	42	16½	460	510	8½	100	39	100 ,, 1⅞	500	1200
9	12	20	280	6	42	19	460	510	8½	101	39	105 ,, 1⅞	500	1350
10	13	20	340	4	39	18½	540	561	9	100	39	110 ,, 1⅞	600	1350
11	13	20	340	6	39	19½	540	561	9	102	39	110 ,, 1⅞	600	1500
12	14	22	400	4	42	21	600	658	11	110	42	120 ,, 2	700	1500
13	14	22	400	6	42	22½	600	658	11	105	42	125 ,, 2	700	1750

When applying for Specifications of Locomotives, the following information is necessary in order to determine which will be the most suitable and economical Engine for the duty to be performed: 1. Gauge of railway. 2. Weight of rails a yard, distance apart of sleepers, and whether joints are fished or not. 3. Length of journey which the Engine is required to make without stoppage. 4. Length of radius of the sharpest curve. 5. Length and gradient of the steepest incline, and whether the Engine has to start on the incline or not. If any curves on the incline, the radius of sharpest to be given. 6. Greatest gross load in tons, including wagons or carriages, which the Engine is required to take at one time.

CHRISTOPHER SEARCH AND CO.,

ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

COAL AND MINERAL WAGONS.

Wagons used upon the main lines of Railway for the transit of coal, are not only subjected to heavy loads, but are exposed to constant and violent shocks in starting, stopping, and shunting. Hence they have to be constructed in the most solid manner, of the best materials, and the quality of the workmanship must be of the highest character. The following points should be attended to in drawing up Specifications for Coal Wagons:

The Framing should be of good sound Oak timber, strongly bolted together; the side and end Planking being of Red Deal, and the Flooring of Spruce; and all Joints should be well bedded in White-lead. The sides and end of the Wagon should be secured by Wrought-Iron Corner Plates, the full depth of the Wagon sides fastened with Bolts and Nuts. All Ironwork should be of the best material. The Wheels should be 3 feet in diameter, with eight Double Spokes, the Tyres of Patent solid Weldless Iron. The Axles should be forged from the best Scrap-Iron. The Bearing Springs should be of good Steel, and secured to the Axle Boxes with Spring Ties, or Bolts and Nuts. Each Wagon should be fitted with a strong Double Brake, and Wrought-Iron Diagonal Stays, to prevent the body of Wagon oscillating. The dimensions of Framing, Axles, Axle Boxes, Wheels, and Buffers must be in accordance with the regulations of the line of Railway on which the Wagons are intended to run. The whole of the woodwork should be well painted with three coats of good oil paint, the ironwork being picked out with black. They must also be properly lettered and numbered in accordance with the regulations of the Railway Companies.

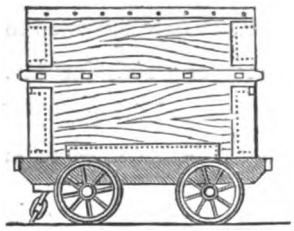
Coal Wagons are made with side and bottom doors, with side and end doors, or with side doors only. The fastenings to these doors are sometimes made self acting. They are seldom provided with spring buffers, though these would evidently greatly reduce the wear and tear, and, consequently, the cost of maintenance; they are, however, sometimes constructed with spring buffers at one end, and dead buffers at the other, which is a very efficient arrangement. They are constructed to carry 6, 8, and 10 tons, of 21 cwt. each, their inside dimensions being 14 ft. 6 in. × 7 ft. × 3 ft., and their average weight 5 tons.

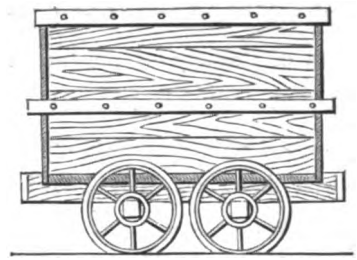
The Prices for Wagon constructed as described above would be:

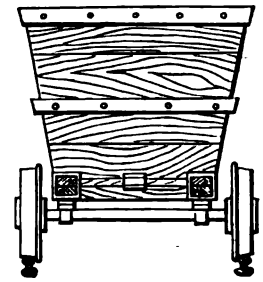
	6 tons.			8 tons.			10 tons.		
	£	s.	d.	£	s.	d.	£	s.	d.
For Cash	66	0	0	72	10	0	81	0	0
On 5 years' Purchase Lease	15	10	0	17	16	0	19	0	0
On 7 years' Purchase Lease	12	0	0	14	0	0	15	0	0

CHRISTOPHER SEARCH AND CO.,
ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

COLLIERY TUBS.







The Wagons used in the underground conveyance of coal, and known by the name of Tubs, require to be constructed as light as they can be, compatible with strength. The roads over which they run being generally rough and uneven, they are constantly liable to be thrown or run off the rails, and for this reason they require to be comparatively light, in order that the men may be able easily and without loss of time to replace them on the rails; they are also required to be light in order that they may be moved rapidly from place to place, and that there may be as little dead weight as possible to be raised and lowered by the engine in the cages. For this reason they are generally constructed of wood, the most suitable for the purpose being oak. The sides and bottom should be about 1 inch thick and firmly fastened together at the angles by iron plates. The roads through which the Tubs run are generally and necessarily low, and the Tubs therefore have to be kept low, which is done by making the wheels of small diameter; ranging in those in which the wheels are placed under the Tub from 8 to 12 inches, and in those in which they are outside the body from 15 to 18 inches. These small wheels of necessity greatly increase the friction on the rails, and to obviate this various kinds of bent or elbow axles have from time to time been introduced, which, by placing the centre above the bottom of the Tub, allow of wheels of much larger diameter being employed.

Coal Tubs are generally constructed to carry from 6 to 9 cwt. of coal, and weigh from 3 to 4 cwt. each, their height above the surface of rails being from 2 ft. 4 in. to 3 ft. 9 in., and their general breadth from 2 ft. 6 in. to 3 feet. Iron Tubs weigh from 1½ to 2 cwt. Larger Tubs, holding from 11 to 12 cwt. each, are sometimes employed, but their extra weight, and consequent extra wear and tear of rails, and loss of time in getting off the rails, together with the slower rate of conveyance both along the roads and in the shaft, add considerably to the cost of maintenance and working of the mine.

Wooden Tubs, £3 10*s*., £3 15*s*., and £4 each.
„ „ Manchester Tipplers, £8 each.
Iron Tram-Wagons and Skips, complete, 36*s*. per cwt.

Crucible Cast Steel Wheels, 36*s*. per cwt.
„ „ Pedestals, 46*s*. per cwt.
Bessemer Steel Axles, 25*s*. per cwt.

KIBBLES.

Whim Kibbles of Hammered Iron, 27*s*. 6*d*. per cwt.
„ „ Rolled Iron, 26*s*. per cwt.
Winze „ „ „ 15*s*. each.
„ „ Plates Hammered, 22*s*. 6*d*. per cwt.

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DRAWING CAGES.

The Cages employed in drawing coal are constructed with one, two, or even three decks or platforms, each deck carrying one or more Tubs. They should be made as light as possible, consistent with strength, in order to reduce to a minimum the proportion of dead weight. In well-constructed Cages even this usually is about two to one in those carrying two Tubs, while in those carrying four Tubs it is about three to two. Drawing Cages should always be provided with a safety hook or attachment, which, by coming in contact with a part of the framework arranged for the purpose, may unship the Cage, and land it in safety on the pit's mouth, and so prevent the possibility of accident from over-winding. Where Cages are employed for raising and lowering the men in the mine, they should always be provided with some kind of safety attachment, by which their descent may be arrested in the event of the machinery or ropes breaking, as otherwise great loss of life may result from these accidents. Cages are always used in the pit with either guide ropes or some kind of iron or timber guide bars, and should therefore be provided with guide rings if to be used with the first arrangement, or with guide cheeks or rollers if with the second. Although the employment of Drawing Cages adds greatly to the dead weight to be raised and lowered in the pit, yet this is more than compensated for by the extra speed with which the Tubs are drawn from the mine, which by their use has been in some cases increased from 3 feet a second to 10, 13, and even 16 feet; and also by simplicity of operation, both of which tend of necessity to economy in working. The output has in many cases been more than doubled by their use, without any increase in the power employed. Generally the best Cages to employ will be found to be those which carry two Tubs on the deck, instead of those with two or more decks.

The Prices for Cages range from about £37 to £45 per ton.

Guide Ropes about 32s. per cwt.

COLLIERY RAILS.

The Rails used for the underground transit in Coal Mines are generally either Bridge or I Rails of light section, averaging, on the engine planes, from 18 to 28 lb. a yard, and being often in the minor roads as low as 10 or 12 lb. a yard. The Rails used at surface for the tramway connecting the pit mouth with the main line of railway average from 40 to 50 lb. a yard. Cast Iron or Plate Rails are sometimes used underground, but the extra cost of maintenance soon more than compensates the saving effected in first cost. The friction on Plate Rails is also much greater than on Salient Rails, the proportion being 12 to 7. Rails are made in lengths of 9, 12, and 15 feet.

Prices, Bridge or Flanged Rails, £9 to £11 per ton.

CHRISTOPHER SEARCH AND CO.,
ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

SEARCH AND CO'S VERTICAL WINDING AND HAULING ENGINES.

B No. 1.

These Engines have been specially designed to meet the convenience of Colliery Proprietors, Mining Engineers, and others, for Winding, Sinking, or Hauling. They consist of a pair of Cylinders working into a double or disc crank-shaft, on which is a pinion driving a spur wheel on the drum shaft. They are fitted with reversing gear, and are self contained on a strong cast-iron box bed plate; they require very little foundation, in fact, some are working bolted to a wood frame only. For underground hauling these Engines are well adapted, being easily taken to pieces to go down the shaft, and being self contained cannot get out of place, and only require fixing as an ordinary crab. They are intended to supersede the semi-portable Engine, their first cost being less than half, and as they are tested with steam, and proved well before leaving the Works, they may be depended upon for good working as soon as they are bolted down and steam applied.

These Engines are fitted with brakes and all necessary grease and oil cups; the connecting rods, eccentric rods, and link motion are all of the best forged scrap iron and case-hardened; the crank shaft and drum shaft are of the best forged scrap iron and fitted with massive gun-metal bearings. All joints are planed, and all parts are made to standard gauges, and fitted in the best possible manner.

Diameter of Cylinder.	Stroke.	Gearing.	Diameter of Drums.	Lagging.	Width of Drums.	Force Pump Extra.	Price.
inches.	inches.	inches.	feet.		feet.	£	£ s. d.
10	12	5 to 1	5	Wood.	6	8	215 0 0
12	12	5 ,, 1	5	,,	6	10	260 0 0

APPROXIMATE WEIGHT, 5½ TONS.

SEARCH AND CO.'S VERTICAL WINDING AND HAULING ENGINES. B No. 2.

These Engines are the same as B No. 1, with *double* drums attached, fitted with double clutches and brakes.

Diameter of Cylinder.	Stroke.	Gearing.	Diameter of Drums.	Lagging.	Width of Drums.	Force Pump Extra.	Price.
inches.	inches.	inches.	ft. in.		feet.	£	£ s. d.
10	12	5 to 1	4 6	Plate Iron.	2	8	272 0 0
12	12	5 ,, 1	4 6	,,	2	10	310 0 0

APPROXIMATE WEIGHT, 5¾ TONS.

SEARCH AND CO.'S DIAGONAL WINDING AND HAULING ENGINES. MARK B.

Diameter of Cylinder.	Stroke.	Gearing.	Number of Drums.	Diameter of Drums.	Lagging.	Width of Drums.	Force Pump Extra.	Price.
inches.	inches.			ft. in.		feet.	£	£ s. d.
12	18	6 to 1	2	4 6	Plate Iron.	2	10	385 0 0
12	18	6 ,, 1	1	5 0	Wood.	5	12	335 0 0
14	18	6 ,, 1	2	4 6	Plate Iron.	2	14	440 0 0
14	18	6 ,, 1	1	5 0	Wood.	5	14	397 0 0

SEARCH AND CO.'S IMPROVED HORIZONTAL WINDING ENGINES.

These Engines are made of the best material, and the workmanship is of the highest class; the link motion, connecting rods, and shafts are of the best scrap iron.

A speciality is made of a pair of Horizontal Engines with reversing gear and drum, 5 feet or 6 feet.

Diameter of Cylinders, 12 inch. Stroke, 24 inch. PRICE, £275.

PRICES OF OTHER SIZES ON APPLICATION.

CHRISTOPHER SEARCH AND CO.,
ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

IMPROVED BEAM PUMPING ENGINES,

FOR WATER AND SEWAGE WORKS, MINES, &c.

These Pumping Engines are of a greatly improved construction, and are particularly adapted for raising water from deep wells or mines to a considerable height. They are made of various sizes, to discharge from 100 gallons to 2000 gallons per minute, and to lift from 100 to 500 feet high. The material and workmanship are of the best description. The Beam is of wrought-iron plates, the Pump has gun-metal working barrel and valve seats. When required, these Engines are fitted with Compound Cylinders and Surface Condensers, for working with a small amount of fuel.

Prices quoted on receipt of the following particulars: 1st. Quantity of water required a minute. 2nd. Depth of well from the surface. 3rd. Height to which the water has to be raised above the surface.

PORTABLE COLLIERY FORCE PUMPS,

FOR HORSE OR STEAM POWER.

These Pumps are specially adapted for underground and narrow workings. They are portable, easily started, very powerful, strong, and durable; and have been supplied to numerous mines and collieries both at home and abroad, and are giving every satisfaction. When working, their vertical height above the water should not exceed 25 feet.

PRICES.

Treble Rams.	Size of Suction and Delivery Pipes.	Strokes a minute.	Vertical height raised by *one* horse.	Number of Gallons raised by *one* horse an hour.	Size of Horse Gear, Pump, and Frame, without Wheels.			Diameter of Horse Track required.	Mounted on Oak Frame, without Wheels.	
					Length.	Width.	Height.		Iron Rams.	Gun-Metal Rams.
inches.	inches.		feet.		feet.	ft. in.	feet.	feet.	£ s.	£ s.
3	2	30	135	1100	5	3 0	2	14	48 10	52 10
4	2½	30	75	..	7	3 4	3	18	54 0	60 0
5	2¾	30	50	..	7	3 4	3	18	57 0	64 10
6	3	30	35	4900	7	3 4	3	18	59 10	68 10

Pole, hook, and swingle tree for one horse, 30*s.* extra.

Two poles, brace, chains, and two swingle trees for two horses, or four bullocks, 70*s.* extra.

Gun-metal plungers are strongly recommended in preference to iron plungers.

Where wheels are necessary, the Mining Engineer fits them to suit his own requirements.

Extra small size Horse-Gear Colliery Engine, with 4-inch double action, instead of treble-barrel Pump, made specially for passing through very narrow workings in mines, complete with pole, hook, and swingle tree, and suction and delivery unions for 2-inch piping, £24.

HAYWARD TYLER AND CO.'S DIRECT-ACTING PUMPING ENGINES.

These Engines, being self contained, require but little foundation, and can be placed in the workings and readily moved forward as the heading advances. They are largely employed in coal pits, raising water to various heights, and are found to perform their work in a satisfactory manner.

CHRISTOPHER SEARCH AND CO.,

ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

HIGH-PRESSURE EXPANSIVE STEAM ENGINES.

FITTED WITH PATENT HIGH-SPEED GOVERNOR.

In these Engines the bed plate, front cylinder cover, cross-head guides, and plummer block for crank-shaft bearing are all cast in one piece, the cylinder with its valve chest being bolted to the end of the bed. The cross-head slippers and connecting-rod ends are made adjustable, so that any wear can be readily taken up. The fly wheel, cylinder end, connecting rod, and crank plate are all bright. All the parts are made to Whitworth's Gauges, so that duplicate parts can be at any time obtained by describing the part required and giving the number of the Engine.

PRICES AND PARTICULARS.

Number	A	B	C	D	E	G	H	J
Diameter of Cylinder	3 in.	4 in.	5 in.	6 in.	8 in.	9 in.	10 in.	12 in.
Length of Stroke	6 in.	8 in.	10 in.	12 in.	16 in.	18 in.	20 in.	24 in.
Revolutions a Minute	240	180	144	120	90	80	72	60
Indicated Horse-power. Speed of Piston 240 feet a Minute, 50 lb. pressure cut off at half-stroke	2·1	3·8	5·9	8·6	15·0	19·4	23·9	34·5
	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.
Price of Engine	27 10	32 0	38 10	46 0	70 0	90 0	110 0	130 0
,, Feed Pump	..	3 0	3 10	4 0	5 10	6 0	7 10	8 0
,, Steam-Jacketed Cylinders	..	..	..	3 0	4 0	4 0	5 0	5 0
,, Variable Expansion-Gear	..	..	..	10 0	12 0	13 0	14 0	15 0

Prices of Engines complete, with Feed Pump, and Cornish Boiler, and all Fittings, may be had on application.

The Robey Mining Engine, and Patent Improved Robey Mining Engine.

These Engines, which are constructed of from 20 to 200 effective horse-power, are specially recommended to Mining Engineers and others, as by their adoption great saving of time and expense of fitting is effected; but very slight foundations being required, and no brick chimneys. They are easy and economical in working. The Engine running at a high speed relatively to the load, there is much less risk of over-winding, the whole machinery is more thoroughly under control, and can be started, reversed, or stopped in any position with the greatest ease; and all the levers being conveniently near to the fire door, one man is enabled to attend to both stoking and driving. The locomotive type of boiler employed will evaporate about 20 per cent. more water per lb. of coal than the Cornish or egg-ended; while at the same time, as it works with an artificially strong draught, an inferior and therefore cheaper class of fuel can be used; the result of the whole being an economy of fuel, as proved by actual comparison with the old type of engine doing the same work, of from 10 to 50 per cent. These Engines are available not only for winding, but for pumping, sawing, &c., which is a great desideratum at a large colliery.

Prices, together with all other particulars required, may be had on application.

Prices, Specifications, and full particulars of any description of Winding, Pumping, Underground Hauling, Mill, Forge, or any other description of Engine, either single or coupled, high pressure or condensing, will be furnished on receipt of information as to the nature of the work to be performed and the power required; at the same time the following Price List of Horizontal High-Pressure Engines fitted with Wrought-Iron Slot Link Reversing Motion, Brake Gear, Drum Rings, &c., complete, will serve as a guide to estimate the probable cost:

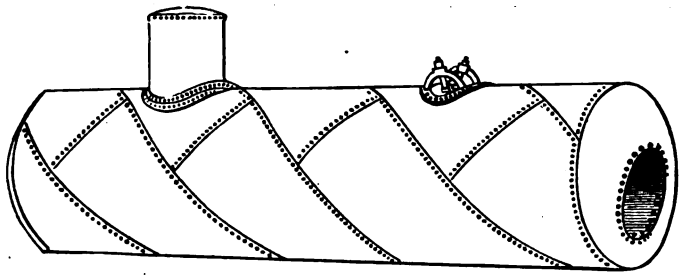
Nominal H.P.	Bore.	Stroke.	Price.	
			A Pair.	Single.
		inches.	£	£
12	12	22	260	130
14	12½	24	310	155
16	14½	27	350	175
20	16	30	440	220
25	18	33	550	275
30	20	36	660	330
40	22	48	880	440
50	26	48	1100	550

Winding Indicators, £12 each.

CHRISTOPHER SEARCH AND CO.,

ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

STEAM BOILERS.



Made from the best Staffordshire Plates, furnished with steam domes, bearing flanges, man and hand hole plates. Boilers with one flue have the furnaces in the flues, and the Prices include fire doors and frames, grate and bearing bars. Boilers with six flues are arranged to have the furnaces outside. Boilers larger than 4 feet in diameter, with two flues, can be arranged with furnaces in the flues, or on the outside, at option.

CORNISH STEAM-BOILERS.

Of the best Staffordshire Plates, and tested to 150 lb. to the square inch. Fitted with furnace bars, doors, and door frames; hand and man hole plates and dead plate.

No.	H.P.	Length.	Diameter.	Diameter of Flue.	Diameter of Dome.	Height of Dome.	Price, with Fittings.
		feet.	inches.	inches.	inches.	inches.	£
1	3	9	36	20	16	22	45
2	4	10	39	21	18	24	52
3	6	12	44	24	20	26	75
4	8	14	48	26	22	28	101
5	10	16	51	28	23	30	110
6	12	17	54	29	24	32	120
7	14	19	56	31	26	33	147
8	16	21	58	32	27	35	170
9	20	24	61	34	28	36	208
10	25	29	64	35	29	39	267
11	30	33	66	36	30	40	304

VERTICAL TUBULAR BOILERS.

The iron in these Boilers is best Staffordshire Plate; the fire boxes of Lowmoor Plate. The tubes are fitted with Patent Expanding Ferrules, and the Boilers tested to 150 lb. to the square inch.

Fittings comprise fire door and frame, bearing and grate bars, stand, smoke box, man and hand hole plates, and crab bars. Mountings comprise steam and water gauges, steam cock and spanner, feed cock and spanner, and safety valve.

No.	H.P.	Height.	Diameter.	No. of Tubes.	Diameter of Tubes.	Price. With Fittings.	Price. With Mountings.
		ft. in.	inches.		inches.	£ s.	£ s.
1	1½	3 8	20	6	2¾	16 10	20 0
2	2	4 8	24	7	2¾	20 10	25 6
3	2½	4 8	28	8	2¾	25 6	29 14
4	3	5 0	32	10	2¾	29 14	35 4
5	4	6 0	35	12	2¾	41 16	47 6
6	5	7 0	36	14	2¾	49 10	55 2
7	6	8 0	38	16	2¾	57 4	64 18
8	8	9 0	42	20	2¾	68 4	77 0
9	10	10 0	48	24	2¾	85 16	95 14

GALLOWAY'S PATENT CONICAL WATER TUBES FOR STEAM BOILERS.

These Tubes are adapted for introduction into any existing Cornish or other Boilers, as the amount of taper in their form is sufficient to allow the bottom flange to pass through the hole in the upper side of the Boiler flue, and the operation of fixing is very simple. The advantages derived from their use are to greatly increase the power of the Boiler, to strengthen the flues, and promote a thorough circulation of water. Their use is becoming very general, and any Boiler Maker can apply them. When ordering these Tubes, it is necessary to give exact dimensions of the internal diameter of flue, and thickness of plates, or the length of tube from inside of one flange to outside of the other flange.

PRICES AT WORKS, INCLUDING ALL CHARGES FOR ROYALTY.

Not exceeding 3 ft. 0 in. in length .. .. 55*s.* each.
" 3 " 6 " " .. .. 60*s.* "
" 4 " 0 " " .. .. 65*s.* "

SUSPENDED WEIGHING MACHINES.

These Machines are used for weighing Minerals and Stores during their removal from ships, canal boats, railway wagons, and the like, by affixing to the crane, thereby converting the crane into a weighing crane, and saving a great amount of time and labour in weighing the goods whilst being lifted. They are small, portable, and easily applied. A kibble or skip can be tared off whilst on the slings or lifting hooks. The smaller sizes are marked in 1 lb. divisions, the larger in 4 or 7 lb. divisions. They commence indicating with the first hundred-weight, and can be made to suit any weights.

PRICES.

No.	Power.	Price.	No.	Power.	Price.
	cwt.	£ s. d.		tons.	£ s. d.
1	20	8 10 0	7	4	21 0 0
2	25	9 12 0	8	5	24 10 0
3	30	10 16 0	9	10	29 0 0
4	40	13 4 0	10	20	44 0 0
5	50	15 12 0	11	30	50 0 0
6	60	17 10 0	12	40	56 10 0

CHRISTOPHER SEARCH AND CO.,
ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

PIT-BANK WEIGHING MACHINES.

The requirements in these Machines are simplicity of construction, and accuracy, speed, and convenience in registering the weight; accuracy being, under the Mines Regulation Act, 1872, of the first importance. These advantages are all to be found in J. W. Stead's Patent Double Steelyard Pit-Bank Weighing Machines; in Messrs. Spencer and Co.'s Patent Dead Weight Pit-Bank Weighing Machines; and in Hodgson and Needham's Patent Triple Steelyard Pit-Bank or Colliery Weighing Machines.

J. W. STEAD'S WEIGHING MACHINES.

These Machines are made to any dimensions and power, and with or without Turn-table or rails, as may be desired. There are no springs or any other objectionable feature; and as all the parts are constructed of the best materials, and with a knowledge of the rough usage to which Pit-Bank Machines are subjected, it is all but impossible for them to get out of order.

THE PRICES OF THESE MACHINES ARE AS FOLLOWS:

Power.	Dimensions of Platform.	Price.	Turn-tables extra.	
cwt.		£ £		£
20	3 ft. 0 in. by 3 ft. 0 in. to 4 ft. 0 in. by 4 ft. 0 in.	18 to 25	3 ft. 0 in.	4
30	3 ,, 6 ,, 3 ,, 0 ,, 4 ,, 4 ,, 3 ,, 9 ,,	23 ,, 29	3 ,, 6 ,,	5
40	4 ,, 0 ,, 4 ,, 0 ,, 5 ,, 0 ,, 3 ,, 6 ,,	31 ,, 33	3 ,, 6 ,,	6
50	4 ,, 0 ,, 4 ,, 0 ,, 5 ,, 0 ,, 3 ,, 6 ,,	35 ,, 37	3 ,, 6 ,,	6

SPENCER'S WEIGHING MACHINES.

In SPENCER AND CO'S Machines the two Steelyards are placed one over the other; the bottom one is divided to cwts. for the minimum weight of load, the top one being made duplicate, one portion to tare by, the other marked to 2 cwt., on which all the weighing will be done. In these Machines the parts most liable to get out of order are constructed of such strength and rigidness that they will not be so subject to disarrangement, and being made without springs or wheels, will not be liable to vary at different temperatures. The Steelyards are marked on each side, so that the weigh and check clerk can see the weight at the same time. They are supplied either with or without Turn-table.

The prices of these Machines are, for a gross power of 25 cwt.:

3 ft. 0 in. Turn-table Platform, £23. 3 ft. 6 in. Turn-table Platform, £25.

HODGSON AND NEEDHAM'S WEIGHING MACHINES.

Messrs. HODGSON AND NEEDHAM'S Patent Triple Steelyard Weighing Machines, of which large numbers are now in use, cannot be surpassed either for quickness in weighing, accuracy, or durability.

These Machines are made with or without Turn-table, and to any length in neck, to suit any position, and are all fitted with Patent Steelyards, having raised brass figures.

Power.	Size of Platform.	Price.	Turn-table extra.
cwt.			
10	3 ft. 6 in. by 2 ft. 6 in.	£11 10	£5 to £6 10
15	3 ,, 6 ,, 2 ,, 6 ,,	£14 0	
20	3 ft. 0 in. by 3 ,, 0 in. and 3 ,, 3 ,, by 3 ft. 3 in.	£16 and £16 10	
25	3 ,, 6 ,, 3 ,, 0 ,, 3 ,, 3 ,, ,, 3 ,, 3 ,,	£18 0	
30	4 ,, 0 in. by 4 ,, 0 ,,	£21 10	
40	5 ,, 0 ,, 4 ,, 0 ,,	£27 0	

HODGSON AND STEAD'S PATENT SELF-INDICATING WEIGHING MACHINE,

CAPABLE OF WEIGHING TWELVE TRUCKS A MINUTE.

PRICE.

20 cwt. .. .. 3 ft. 0 in. by 3 ft. 0 in., and 3 ft. 3 in. by 3 ft. 3 in. .. .. £27 and £29.

POOLEY'S PATENT SELF-INDICATING PIT-BANK WEIGHING MACHINE,

WITH OR WITHOUT TURN-TABLE.

PRICE.

With Turn-table, 20 cwt. .. £51 to £59. Without Turn-table, 15 cwt. and 20 cwt. .. £31 to £40.

Drawings and Specifications of Surface Works on application.

CHRISTOPHER SEARCH AND CO.,
ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

BLOWING FANS.

FOR FOUNDRIES, VENTILATING, BLACKSMITHS' FIRES, &c.

These Fans are noiseless and create no annoyance, so that they can be fixed within a workshop or foundry wherever it is most convenient, and are of the best design and workmanship.

PLAIN BLAST FANS.

No.	Diameter of Fan Case.	Diameter of Discharge Pipe.	Number of Smiths' Fires supplied.	Tons of Iron melted in one Hour.	Diameter of Driving Pulleys.	Price of Counter-shaft.	Price of Fans.
	inches.	inches.			inches.		£ s. d.
1	14	3	1	..	3		3 12 0
2	21	4½	3	..	4½		5 8 0
3	27	6	7	1¼	6		7 4 0
4	36	8	10	1⅞	8	To	12 0 0
5	42	10	14	2½	10	Estimate.	14 8 0
6	61	14	30	5	14		25 0 0
7	77	18	70	10	18		43 15 0
8	96	24	160	20	24		68 15 0

COMPOUND EXHAUST FANS, WITH DOUBLE INLETS.

For Ventilating by induction, or can be employed for ordinary purposes, the same as the Fans in the first List.

No.	Diameter of Discharge Pipe.	Cubic Feet of Air discharged each Minute.	Number of Revolutions a Minute.	Price of Counter-shaft.	Price of Fans.
	inches.				£ s. d.
1	4½	600	Instructions sent with Fans.	From £5 to £6 for each inch of diameter.	7 4 0
2	6	1000			9 12 0
3	8	2500			15 12 0
4	10	4000			20 8 0
5	14	8000			32 10 0
6	18	14000			58 15 0
7	24	28000			90 0 0

ROOTS' PATENT ROTARY BLOWER.

The advantages possessed by the Blowers over the ordinary Fan are:—1. They give a force blast, and thus give a regularity and reliability of blast never given by a Fan. 2. They effect a saving of at least half the power by performing more effectively, at a speed of 200 to 400 revolutions a minute, the work which would require with a Fan a speed of from 2000 to 4000 revolutions a minute. This comparatively slow motion greatly increases its durability, there being much less wear and tear of belting, and the running parts of the machine. 3. A material saving of coke by producing a more perfect combustion, while at the same time an inferior quality of coke can be used with a Blower than with a Fan. These Blowers are largely employed both in this country and in America, upwards of 900 being in use at the present time. The conducting pipes should be of iron and perfectly tight, as no dependence can be placed either on tile piping or underground brick flues. In ordering Blowers, it should be stated whether the delivery outlet is to be fixed at the bottom or top of the machine. Air-tight pipes, with shut-off valves, are necessary between the Blower and the Cupola, or smiths' fires, and should be fitted with an escape valve; the extra charge for this ranges from 15s. to 80s., according to the size of Blower and number of fires.

PRICES.

No.	Revolutions a Minute.	Cubic Feet of Air a Minute.	Weight.	Power required.	Price.
			cwt.	Horse-power.	£ s. d.
1A	350	800	6	½	27 0 0
1	400	1300	8½	1	30 0 0
2	400	2000	10	2	40 0 0
3	380	3000	14	4	55 0 0
4	350	4550	24	6	75 0 0
5	320	6400	27⅓	8	95 0 0
6	310	8680	49	11	120 0 0
7	300	10800	53½	14	150 0 0

These Blowers are also supplied, arranged to be driven with Vertical Engines, all on one bed plate, and occupying small space.

Special Blowers for ventilating mines, exhausting 50,000, 100,000, or 200,000 cubic feet of air a minute, with or without Engines, fitted up complete.

Prices of these and all other special Blowers, together with full particulars, can be had on application.

CHRISTOPHER SEARCH AND CO.,
ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

BELLOWS.

	30 in.	32 in.	34 in.	36 in.
Ordinary	60*s.*	72*s.*	90*s.*	115*s.* each.

	26 in.	28 in.	30 in.	32 in.	34 in.	36 in.
Circular, with Iron Frame	130*s.*	152*s.*	177*s.* 6*d.*	200*s.*	235*s.*	265*s.* each.

ROOTS' PATENT PORTABLE FORGES.

These Portable Forges are believed to be superior to any others in use; they are compact, durable, and efficient. The blast is produced by a small Roots' Patent Blower. In estimating the value of these Forges, and comparing the Prices with those of the ordinary kind with bellows, it must be remembered that the Patent Forge with the Blower is not only stronger, but is, size for size, more effective, and heats in much less time than a bellows forge.

PRICES.

No.	Size of Hearth.	Weight.	Price.	Remarks.
1.	21 in. × 15 in.	1¼ cwt.	£9 10*s.*	Suitable for small rivet heating.
2.	20 „ 14 „	2½ „	£11 10*s.*	Ordinary rivet-heating fire.
3.	30 „ 21 „	3½ „	£15 10*s.*	Rivet heating or small Smith work, and mending tools.
4.	40 „ 26 „	5½ „	£21 10*s.*	Ordinary Blacksmiths' work.

Nos. 3 and 4 can be fitted with travelling wheels and handle at an extra charge of 15*s.* each. No. 2 is always mounted on wheels. No. 1 does not require wheels.

Ordinary Portable Forges from £4 each, according to size.
„ „ „ on Wheels, from £5 each, according to size.

COAL-BREAKING MACHINERY.

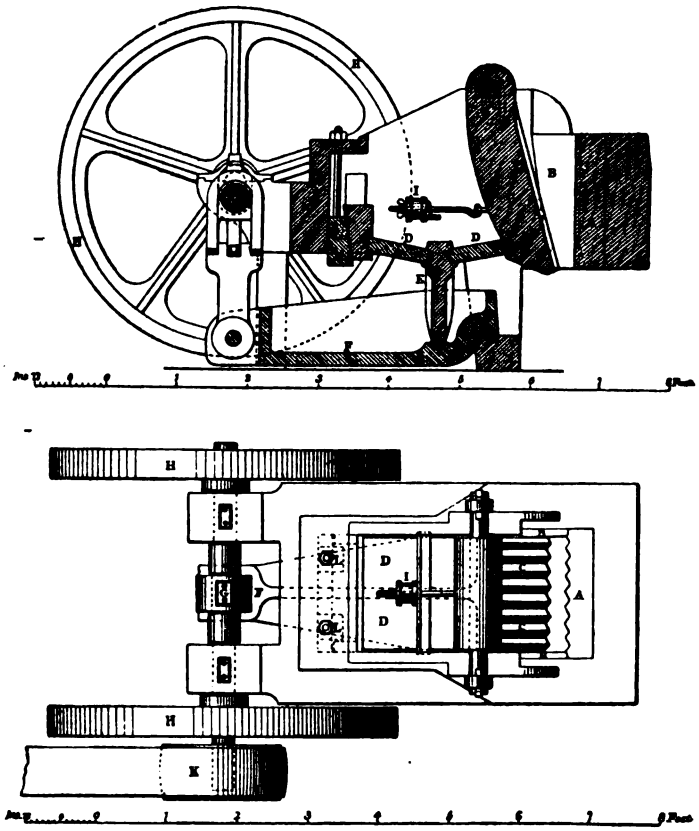
Wherever it is desired to obtain a sample of coal of even size, whether for making gas or feeding furnaces by automatic or other apparatus, Blake's Patent Coal Crushers will be found to be the most suitable and economical Machines. They are largely employed in Gas and other Works for breaking Cannel and other Coals, and also for breaking Fire Clays, Shale-Oil Coal, and Coal for Coking purposes, Phosphates and Nitrate Soda for Artificial Manure Works, Chalks and Gypsum for Plaster Works; and also by Colour Manufacturers.

PRICES.

Size.	H.P. required.	Weight.	Price.
			£
12 in. by 5 in.	3	2 tons 5 cwt.	75
12 „ 7 „	4	2 „ 10 „	80
24 „ 12 „	7	4 „ 15 „	200
24 „ 16 „	8	5 „ 5 „	230

CHRISTOPHER SEARCH AND CO.,
ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

ORE-CRUSHING MACHINERY.



For crushing all kinds of ore for the stamps or blast furnace, Blake's Machine appears to stand unrivalled, both on account of its power, simplicity of construction, and quality of work performed. Referring to the figures, it will be seen that the fixed jaw A, against which the stone is crushed, is a vertical fluted block of cast iron, bedded in zinc, in the end of the very strong cast-iron frame of the Machine, and held in its place by loose tapered cheek-pieces B, B, which fit into recesses on each side of the hopper. The movable jaw C is fluted on the breaking face to correspond with the fixed jaw, the ridges of the movable jaw being opposite the grooves of the fixed jaw; and the movable jaw is suspended from a large transverse pin above the frame. At the back of the movable jaw, to give the motion, are two struts D, D, in the form of flat cast-iron plates, extending the whole width of the jaw, and bearing in the middle the upright thrust-bar E; this bears at the bottom upon the main lever F, the whole forming a toggle joint of simple construction and great strength. When employed for ore crushing these Machines are often fitted with a Revolving Picking Table, by means of which appliance one hundred tons of ore, such as tough Elvin Rock, can be crushed and separated in a day of ten hours; and when worked in combination with the stamps, a clear saving of £25 per cent. is effected. The jaws of each Machine can readily be adjusted to give the product any size required, from 2½ inches to fine gravel.

A special Wrought-Iron Machine is made for exportation, which possesses the advantages of lightness combined with strength, perfect security from breakage, great rigidity, and easy transhipment. It is constructed of strong faggots of Wrought Iron, dovetailed together, all the parts being planed to fit accurately; tie bolts are then inserted, which hold the whole together, but are relieved of any strain due to the working of the Machine. The sides and ends are of Boiler Plate. Each piece weighs under 3 cwt., and is made for transit on mules' backs in mountainous districts, where no other mode of carriage is available. They are the only Machines which have been found to answer the purpose; they are very simple, strong, and durable, the working expenses are light, and the wear and tear 30 per cent. less than any other machinery exported for a similar purpose. They are made in two sizes, 10 in. by 7 in., and 15 in. by 9 in., but may be had made in other sizes if required.

There are at the present time upwards of 950 of all kinds of these Machines at work in all parts of the world.

PRICE.

The Prices of these Machines range, according to size and power, from £75 to £375; or, with Screen, from £80 to £390. Revolving Picking Table, £12 extra.

Wrought-Iron Machine for export, 10 in. by 7 in., £167. 15 in. by 9 in., £225.

Hand-power Machines, complete with driving frame, £15 to £75. Fitted with Screen, £5 extra.

These Machines are also made combined with Steam Engine. Prices and particulars of these, and all other information, can be obtained on application.

CHRISTOPHER SEARCH AND CO.,

ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

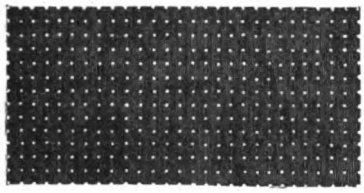
ARCHER'S PATENT ORE-CRUSHER.

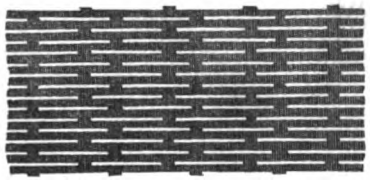
This Machine, which is very similar to Blake's, is one of the most simple and cheapest of its kind. It is constructed in such a manner as to combine great effective power with the least amount of friction, and is adapted for being worked either by manual labour or steam power. The cam on the main shaft having two rises, each revolution of the shaft raises the end of the lever twice, and gives two thrusts to the jaw.

Size of Machine at mouth.	Quantity broken a Day.	Power required.	Price.	Travelling Wheels and Horse Frame, if required.	If with Elevators attached, extra.
inches.	tons.	H.P.	£	£	£
30 by 12	130	10	245		
18 ,, 12	80 to 100	8	195		
18 ,, 9	60	6	180	30	45
15 ,, 7	50	5	145	25	40
10 ,, 5	30	3	85	20	30
		Men.			
10 ,, 5	10	4	75	20	
8 ,, 4	7	2 to 4	60	15	
6 ,, 3½	5	2	35	10	

STAMPS IRONWORK.

CAST-IRON STAMPS AXLES, ordinary pattern .. .. 15*s.* 0*d.* per cwt.
,, ,, with centre ends, turned and fitted .. .. 16*s.* 6*d.* ,,
CENTRE ENDS only, turned and faced .. .. 18*s.* 6*d.* ,,
STAMPS HEADS, without shank and ground .. .. 8*s.* 0*d.* ,,
,, ,, with short shanks of faggotted iron .. .. 10*s.* 0*d.* ,,
,, ,, with long shanks .. .. 12*s.* 0*d.* ,,
WROUGHT-IRON STAMPS TONGUES, steeled complete .. .. 8½*d.* per lb.
,, ,, not steeled .. .. 7*d.* ,,
CAST-IRON STAMPS CAMS .. .. 10*s.* 0*d.* per cwt.





STAMPS GRATE PLATES .. .. 11*s.* 6*d.* per cwt.
,, GUIDES AND BRACES .. .. 11*s.* 6*d.* ,,
,, BUSHINGS AND BRANDICES .. .. 13*s.* 6*d.* ,,

CRUSHER AND DRESSING IRONWORK.

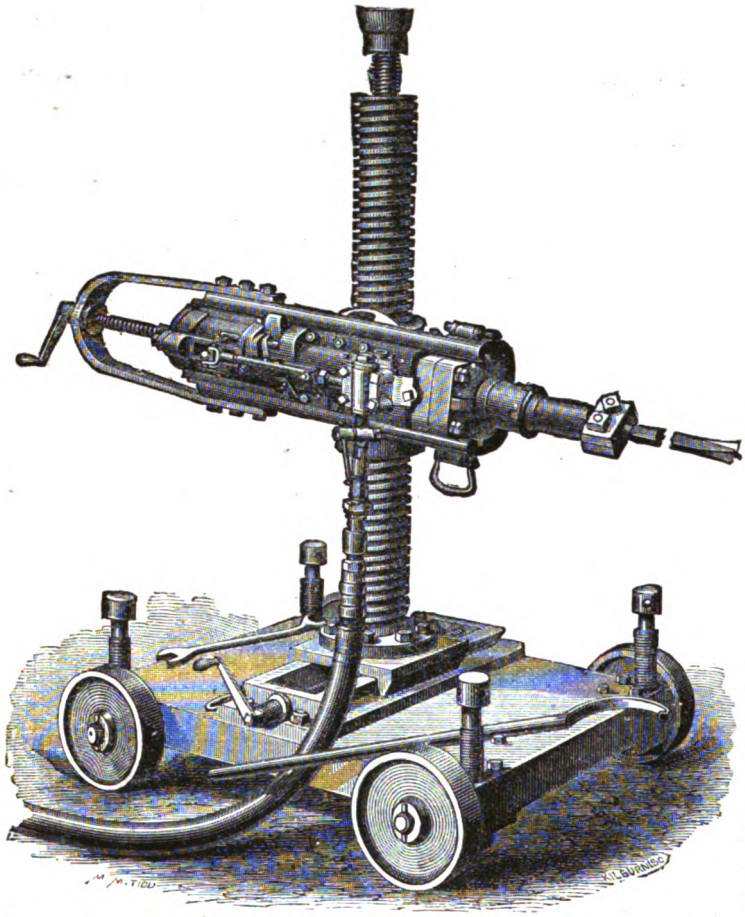
CRUSHER ROLLS, cast in sand .. .. 12*s.* 6*d.* per cwt.
,, ,, cast in chills .. .. 16*s.* 6*d.* ,,
PLAIN CASTINGS FOR BUDDLES .. .. 14*s.* to 20*s.* per cwt.
LIGHT ,, ,, ,, ... according to pattern.

Drawings, Specifications, and particulars of complete Stamp Batteries, Buddles, Crushing Rolls, Separators, Trunking Machines either for Hand or Power, Brunton's Calciners, Washing Trunks, Griddles and Sieves, Jiggers, Brunton's Cloths, Hotching Machines, Ore Washers, Ore Calciners, Percussion Tables, and the like, of the most modern and approved construction, furnished upon application.

CHRISTOPHER SEARCH AND CO.,

ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

THE "BURLEIGH" ROCK DRILL.



This Machine, of which there are at the present time upwards of 650 in use, is applicable to every form of rock work. It is strong, light, compact, and easily handled. The principal parts of the Machine are the Cylinder with its Piston, and the Cradle with guide ways in which the Cylinder travels. The action of the piston is similar to that of the ordinary steam hammer, with this difference, that in addition to the reciprocating, it has also a rotary motion. The drill point is held in a slip socket, or clamp, at the end of the piston rod, by means of bolts and nuts. The drill point rotates regularly at each stroke of the piston, making a complete revolution in every eighteen strokes. By the use of the universal clamp, which can be attached to any form of tripod, carriage, or frame, the Machine may be worked in any required direction, either vertically, horizontally, or at any angle. This Machine may be driven either by steam or compressed air, the latter being preferable for all mining and tunnelling operations.

PRICES.

A.	New Size for mining purposes, will drill holes from 1 inch to 2 inches diameter	£95
B.	"Jumper," for mining purposes, will drill holes up to 3 inches diameter	120
C.	"Medium," for mines, quarries, or contractors, will drill holes up to 4 inches diameter	135
D.	"Tunnel," for tunnelling and quarrying, will drill holes up to 5 inches diameter and 20 feet deep..	150

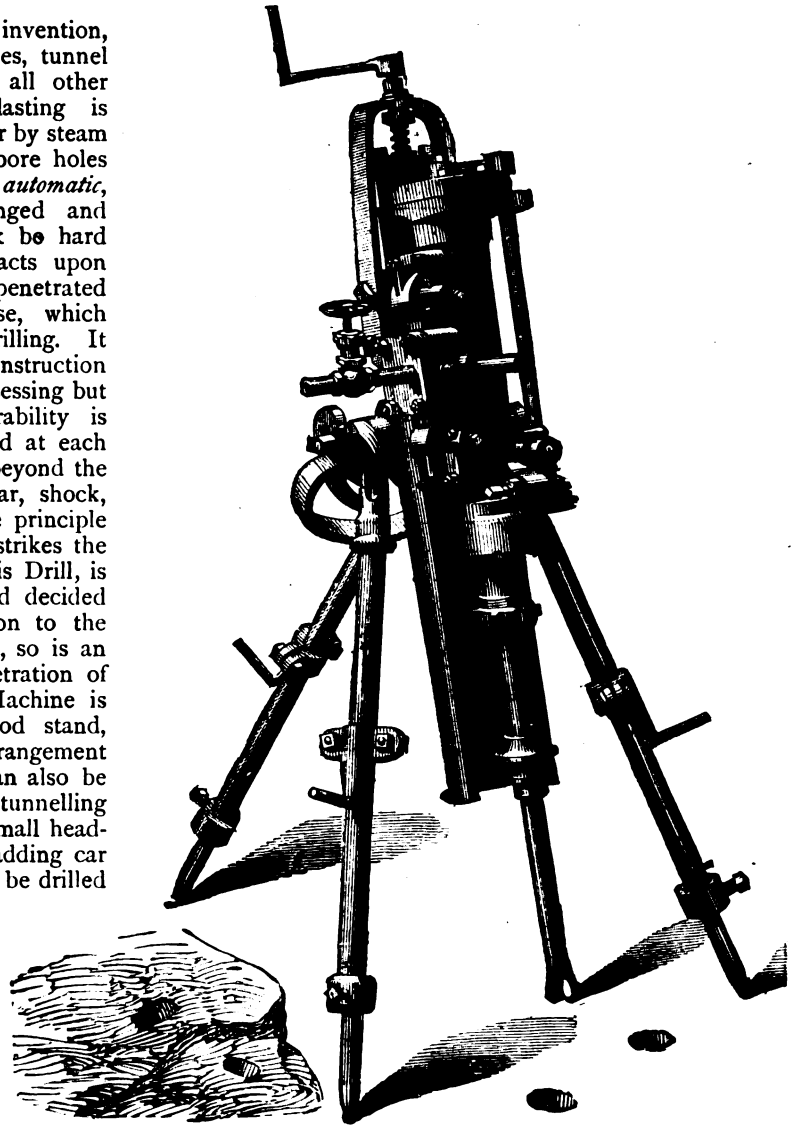
These Prices are for the Drills complete, with Tripod, Universal Clamp, and all Royalties.

Practical Instructions as to the use of Machine Drills in either Quarries, Headings, or Shafts furnished on application.

CHRISTOPHER SEARCH AND CO.,
ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

THE INGERSOLL ROCK DRILL.

This Drill, which is of late invention, is intended for use in mines, tunnel work, shafts, sewering, and all other rock excavation where blasting is necessary. It is driven either by steam or compressed air, and will bore holes at any angle. The feed is *automatic*, and is so carefully arranged and balanced, that, let the rock be hard or soft, the piston never acts upon the feed until the rock is penetrated sufficiently for this purpose, which results in steady and rapid drilling. It is very simple, both in its construction and mode of operation; possessing but few moving parts, its durability is assured, and being cushioned at each end inside the cylinder and beyond the regular piston stroke, all jar, shock, and injury is avoided. The principle of forcing the piston until it strikes the rock, which is adopted in this Drill, is another feature of great and decided importance, for in proportion to the pressure of steam or air used, so is an increased speed in the penetration of the rock attained. This Machine is usually mounted on a tripod stand, which is the most suitable arrangement for vertical drilling, but it can also be had mounted either on a tunnelling column for use in shafts or small headings, on a newly-designed gadding car by the use of which holes can be drilled either vertically or horizontally, and stone taken out to any dimensions, or on various sized cars, according to the number of drills required for use in railways and other large tunnels.



PRICES.

Weight of Cylinder and Tripod complete.	Diameter of Cylinder.	Stroke of Piston.	To bore holes.		Price of Cylinder and Tripod complete.
			Diameter.	Depth.	
lb.	inches.	inches.	inches.	feet.	£
818	5	5½ and 8	1¾ to 5	40	170
717	4	7	1¾ ,, 3	20	145
415	3½	5 and 7	1¼ ,, 2	15	120
173	2½	3½	⅜ ,, 1¾	10	95

Prices of Cylinder or Tripod separately, and of all other kinds of supports and cars for use in tunnels and other works, together with any further information required, may be obtained on application.

CHRISTOPHER SEARCH AND CO.,
ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

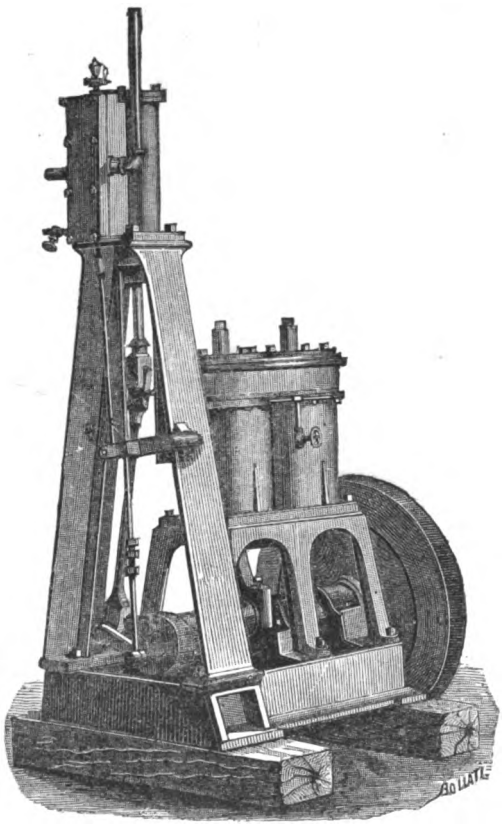
THE WARSOP AIR-COMPRESSOR.

This Machine consists of a Steam Engine and Air Compressor combined, working on one crank shaft, with cranks set at right angles, so that the steam exerts the greatest force where the air offers the greatest resistance; this secures uniformity of movement and the best results. Every attention has been given to the design and proportion of this Machine to ensure durability, simplicity, and strength, and the whole is carried on one bed plate so as to render fixing as easy as possible. Water is drawn into the cylinder in the form of spray at each stroke, which absorbs the heat of the compressed air, greatly assists in reducing its bulk, and lubricates the cylinder. By uncoupling the Compressor the Engine may be used for any ordinary purpose requiring steam power; a matter of importance in outlying districts. Special means are also adopted for preventing the *formation of Ice* in the machines driven by this Compressor.

PARTICULARS AND PRICES.

No.	Diameter of Steam Cylinder.	Diameter of Double-Acting Air Compressor.	Length of Stroke of Cylinder and Pump.	Revolutions a Minute.	Approximate Weight in cwts.	Cubic Feet of Air delivered at atmospheric pressure a Minute.	Cubic Feet of Air delivered at 35 lb. pressure a Minute.	Price.
	inches.	inches.	inches.					£
1	7	7	12	120	19	63	16	85
2	8½	8½	14	100	37	102	28	125
3	12	12	16	90	54	190	47·5	210
3A	Two 12	Two 13	16	90	75	428	107	350
4	15	15	20	75	80	290	72·5	295
5	20	20	36	40	120	523	130	465
6	26	26	36	40	200	883	220	765
6A	Two 26	Two 28	36	40	..	4048	1012	1400
7	30	32	48	30	..	1340	335	1020

THE "BURLEIGH" AIR-COMPRESSOR



Consists of a Steam Engine and two Single-Acting Air Pumps worked by a three-throw crank. The connecting rods are attached to the inside of each air piston—which is made in the trunk form—to which a valve is so fitted that at the descent of the piston it opens and at the ascent closes. The air chambers are also fitted with two valves, one directly over each piston, each of which opens at the ascent of its piston and closes on its descent, similar to the action of an ordinary pump. At each downward stroke of the pistons a small jet of water is made to play in the air chambers, which cools the air and lubricates the pistons; or, for the former result, the valve chest may be encased in a water jacket. The angles of the crank shaft are so set that when the greatest power is developed in the steam cylinder, the point of the greatest compression is being reached in the air cylinders alternately. Besides steam, any other available driving power, however, may be applied. The crank shaft may be driven from a pulley or by gearing driven from a water wheel, turbine, or portable engine. The compressed air is forced from the upper chambers of the air cylinders into a capacious receiver, whence a uniform pressure is maintained.

PARTICULARS AND PRICES.

No.	Steam Cylinders.	Air Cylinders, each.	Size of Base.	Extreme Height.
	inches.	inches.	inches.	feet. inches.
1	8 diameter, 12 stroke	10½ diameter, 18 stroke	56 × 43	7 0
2	9½ diameter, 18 stroke	12 diameter, 15 stroke	61 ,, 49	8 10

No.	Air compressed a Minute at 90 Revolutions.	Size of Discharge Pipe.	Price. With Engine.	Price Without Engine.
	cubic feet.	inches.	£	£
1	90	2½	180	125
2	176	4	275	210

IMPROVED AIR RECEIVER, FITTED WITH PRESSURE GAUGE AND BLOW-OFF TAP, PRICE £35.
FORCE PUMPS, FOR FEEDING BOILERS, FITTED ON COMPRRSSORS, PRICE £10 TO £20.

CHRISTOPHER SEARCH AND CO.,

ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

COAL-CUTTING MACHINES.

The introduction of mechanical contrivances into Collieries to assist in getting Coal has of late been so much discussed, and the advantages to be derived therefrom so generally admitted, that the question is now reduced mainly to one, of which Machine will best answer the special requirements of the Coal proprietor, and at the least cost do the largest amount of work.

The Machines described below have been long in practical operation, under a variety of circumstances, and we are, therefore, enabled with every confidence to recommend them. They are designed for holing or undercutting, and are more especially adapted for collieries worked on the "Long Wall," or some similar system, where a considerable length of face can be operated upon.

"THE ECONOMIC" COAL-CUTTER.

This Machine is a very simple, light, cheap, and most efficient coal cutter; and is driven by compressed air, at the low pressure of 25 to 30 lb. a square inch, varying with the hardness of the mineral to be cut. The Machine requires no fixing, it can be made to suit any gauge, and will travel round the usual curves. It will cut close down to the rails, and when of the ordinary size—7 ft. 6 in. long, 2 ft. 4 in. wide, 2 feet high, and weighing about 15 cwt.—will undercut the coal to a depth of 3 feet, the width of the groove being 3 inches. The undercut may, if necessary, be at an angle from the horizontal. A stronger Machine can be made to undercut to a depth of 5 feet. The cutters require no fastening in the bar, being self fixing; when inserted they are comparatively costless, and can be made or sharpened by any colliery smith.

PRICE.

To undercut 3 feet £144

GILLOT AND COPLEY'S PATENT ROTARY COAL-CUTTER.

This Machine is made principally of steel and wrought iron, thus combining the greatest strength in the smallest space with the least weight. The frame is of angle iron, about 5 ft. 4 in. long by 2 ft. 4 in. wide, and on this are fixed two cylinders 7½ in. diameter, with a 9 in. stroke, working on to a crank shaft, which by a very simple arrangement drives the pinion which gears into the slots of the cutter wheel. This wheel, which is of cast steel, is carried by a bracket projecting horizontally from the side of the Machine, it makes about six revolutions a minute, and on its outer edge are fixed twenty steel picks or cutters, thus giving 120 strokes a minute; it is 3 ft 10 in. diameter, and makes a clean cut of 3 ft. 4 in. deep by 2½ in. to 3 in. thick, and from this space it entirely sweeps out the whole of the coal as it revolves. The cutter wheel is easily removed by slacking four bolts, and then the Machine can be run off to any other part of the workings where it may be required. The picks, which are made of tool steel, are as easily sharpened as an ordinary pick point, and are about 4 inches long by three-quarters of an inch square. It can be made to cut level with the floor, in a parting between two coals 3 feet or more above the trams, or at any other level, and is applicable for any seam of coal where a height of not less than 20 inches can be afforded for it to travel along the coal face. It will cut in fire-clay seating, *hard or soft coal*, or take out a pricking between two coals. It is driven by compressed air, and works at the low pressure of from 20 to 30 lb. per square inch. A fair average rate of work with 27 lb. pressure may be stated at 30 yards an hour, 3 ft. 4 in. under and 3 feet thick, either in a seating or moderately hard coal; the rate of holing by manual labour, in the fire-clay seating above named, is about 7 yards for a day's work; this gives about nine men working a whole day to do what the Machine does better in two hours. The men have only to wedge or shoot the coal down and clear it away whilst the Machine is taken to another bank to do its work there. The Machine is covered with a movable sheet-iron casing to protect it from anything falling from the roof. One man only is required to be in attendance on the Machine, and another should follow to sprag the coal as it is cut.

PRICE £200

"GLEDHILL'S PATENT IMPROVED COAL-CUTTING MACHINE."

The cutting in these Machines is done by an endless chain with cutters attached, driven round a jib or arm which projects underneath the coal from 2 ft. 9 in. up to 4 feet, as required. By reversing the motion and cutting tools, the Machine travels and cuts in either direction, and the gearing can be altered to speed required by the nature of the coal or other material cut. The undercut of this Machine being only 2¾ inches high, the dross or small coal produced is reduced to a minimum. The Machine also increases two to three fold the quantity of coal that can be taken by manual undercutting from a given face in a given time, and so lessens the up-keep of roads, and the area of supervision and ventilation, &c. The principal saving, however, is in the cost of undercutting. At work it is attended by three men—one driving, one lifting roadway behind Machine, and the other laying roadway in front, &c. The cutters are sharpened each shift, the cutting chain being brought to bank daily for this purpose, the cutters removed, sharpened, dressed to a gauge, and again fixed to chain. The Machine is actuated by air compressed on pit bank to 35 or 40 lb. on the square inch, and conveyed therefrom in cast-iron pipes. The present work done is 420 feet, cut 2 ft. 9 in. deep, in a shift of seven to eight hours, and as the seam worked is 2 ft. 10 in. thick, this yields 75 to 90 tons.

These Machines are of two sizes: No. 1., 2 ft. 4 in. high, requires about 3 feet of head room between pavement and roof. No. 2. is 1 ft. 8 in. high, including roadway, and so is capable of working the thinnest seam.

PRICE.

	£
Free on Rail in England	210
Packed for Export	240

WINSTANLEY & BARKER'S PATENT COAL-CUTTING MACHINE.

This Machine is driven by compressed air, the pressure required being from 20 to 30 lb. on the square inch, according to the nature of the coal or mineral to be cut. This Machine stands only 22 inches high, and being very simple in construction is not at all liable to get out of repair; the gauge of the wheels can be made to suit any ordinary colliery tramway. The cutter holes its own way into the coal, cutting, in fact, from nothing up to 3 feet or more in depth, the thickness of the groove being 3 inches, while the quantity of small coal made represents only from 25 to 35 per cent. of that produced by hand holing. The average rate of holing in hard coal, with a pressure of 30 lb. on the square inch, is 25 yards an hour, including stoppages, and this may be considered to equal the work which would be done by at least *thirty men* in the same time. This Machine has been in *successful operation for three years and a half*, without alteration, in a seam of coal 2 ft. 4 in. in thickness.

PRICE.

Including two sets of cutters, a small crab or winch, and packing—Free in London .. £250.

CHRISTOPHER SEARCH AND CO.,

ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

MACHINERY FOR THE MANUFACTURE OF CEMENTS.

The value of Cement depends to a very marked degree upon the care with which the mechanical processes connected with the manufacture are conducted. Taking this into consideration, we have arranged a set of Machines for the manufacture of Portland and other Cements, constructed upon the most approved principles, with a strict view to economy in cost, as well as in operation.

THE PLANT CONSISTS OF:

WASHING MILLS,

OF VARIOUS SIZES, FROM 12 FEET TO 36 FEET DIAMETER,

FOR WASHING AND INCORPORATING THE CHALK, CLAY, AND OTHER RAW MATERIALS.

CRUSHING MILLS,

EITHER HORIZONTAL OR VERTICAL, FOR CRUSHING THE STONE FROM THE KILN.

GRINDING MILLS.

IN THESE THE FINAL REDUCTION IS EFFECTED; PARTICULAR ATTENTION HAS BEEN GIVEN TO THEIR CONSTRUCTION TO DELIVER THE CEMENT IN THE BEST POSSIBLE CONDITION.

SIEVES AND SIFTERS, PUMPS, TESTING MACHINES, and all ACCESSORIES.

Prices on receipt of Particulars as to Quantity required in a certain time, Local Conditions, &c.

CHRISTOPHER SEARCH AND CO.,
ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

BRICK-MAKING MACHINERY.

The application of machinery to the manufacture of bricks has for its objects economy, certainty, and expedition of production, and improvement in the quality and appearance of the bricks. It is still a question how far these objects have been attained; and out of the large number of machines invented for brick-making, but few, omitting tile and pipe-making machines, are at present in regular work.

The Machines, however, described below can with confidence be recommended, both on account of simplicity of construction and working, and superiority of bricks produced.

JOHNSON'S PRIZE BRICK-MAKING MACHINE.

This Machine is capable of making 15,000 bricks in ten hours, with one man feeding and a boy cutting off. It can be adapted to almost any description of clay; and from the great pressure applied, a very solid and well-squared brick is produced; whilst, from the extreme simplicity of its construction, it is easily worked by those hitherto unaccustomed to machinery, and derangement is almost impossible. These Machines are also capable of working the clay direct from the natural formation without its having been dug and turned over. The side on which the hoist is required must be specified. The Machine can be driven by belt and pulley if required.

For temporary purposes a small Machine is made without the pug knives; the clay, therefore, is only acted upon by the screw, and requires to be dug and watered before coming to the Machine. This, however, enables a much less engine to be employed, and hence a very handy light tool is secured. It requires no fixing or foundation and is easily moved about from place to place, being set on wheels; the total weight, without water in the boiler, being under 2 tons. The quantity of bricks produced is about 10,000 in a day of ten hours.

PRICES.

		£
No. 1.	Machine complete, with brick die, driving wheel and pinion, ready to attach to engine	95
2.	,, ,, with crushing rollers, brick die, driving wheel, and pinion to attach to engine	195
3.	,, ,, with two pairs crushing rollers, brick die, driving wheel, and pinion to attach to engine	350
4.	Portable Machine complete, with 6 horse-power engine and boiler, and set on wheels	190
	Clay Hoist	£15
	Creeper Gear	15

Extra, if packed in strong cases for export, £5 to £9 10s.

SCHOLEFIELD'S PATENT BRICK-MAKING MACHINE.

This Machine is very simple in construction, requires no skilled workman to attend it, and all its parts being exposed, can be seen when working. It is very portable, being easily fixed to any existing plant at little cost, and does not easily get out of repair. It effects great saving in labour, as the material is worked up in the same state as taken from the ground, after passing through grinding rollers to crush all hard substances, and produces a better quality of brick. The bricks made by this Machine require no shed room for drying, as they are made in a semi-dry state, yet with sufficient moisture to preserve a good arridge, and are so dry that they can be taken direct from the machine to the kiln, thus greatly reducing the cost for fuel. It will make first-class pressed bricks from any description of material, as clay, bind, shale, or marl; and of any of the following shapes, namely, square, bull-nose, culvert, circular, and bevelled-corner, and the like; and can be altered to make any thickness of brick in a moment. This Machine, when driven by a 4 horse-power engine, is capable of turning out 10,000 bricks a day.

PRICE £185

CLAY BREAKERS FOR ABOVE .. .. £12 10s.

CHRISTOPHER SEARCH AND CO.,

ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

BODMER'S PATENT BRICK-MAKING MACHINE,

For the manufacture of Bodmer's Patent Compressed Stone Bricks of Sand and Lime, Blast-Furnace Slag and Lime, and similar materials.

The process of brick-making by this Machine is very simple. Hoppers are filled by hand with the materials employed, each into its separate hopper; from this point to the removal of the finished bricks all operations are automatic. Measured portions of each ingredient are caused to fall upon a travelling belt, which delivers the mixture into an apparatus, in which it is thoroughly incorporated, and from which it is deposited upon a second travelling belt, which carries it to the press, where measured quantities are delivered into the moulds. The press is hydraulic, consisting of a circular table, revolving horizontally, and of course stopping when pressure is applied. The table contains six pairs of moulds, making, therefore, one-sixth of a revolution between the stoppages for application of pressure. Two pairs of moulds are subject to pressure at once, two other pairs being automatically filled, and the bricks rising out of the remaining two pairs simultaneously. The bricks are removed by hand to barrows, and conveyed to the yard, where they are left to ripen. The time required for this varies according to the quality of the lime used, and also according to the weather, from one to two months, but the hardening goes on for years. Seven strokes a minute are made by the press, giving in that time 28 bricks, or about 80,000 a week, as the result of the labour of two men and four boys, exclusive of wheelers and pilers. When sand is used, from one-sixth to one-eighth of its weight of lime is necessary, but with slag as little as one-sixteenth of its weight of lime may be employed to produce a good quality of building brick, weighing about 58 cwt. a thousand. The cost in wages varies from 3*s.* to 3*s.* 6*d.* a thousand. These bricks require no burning.

PRICES ON APPLICATION.

CLAY-CRUSHING ROLLING MILLS.

	£
Complete, with Fast-and-Loose Pulleys, Gearing, and Fixing Bolts, to crush Clay for 12,000 to 15,000 Bricks a day	63
,, ,, ,, ,, ,, 20,000 to 23,000 ,,	66
,, ,, ,, ,, ,, 30,000 to 35,000 ,,	92
Pugging Mills, complete .. .. £18, £20, and £25.	
,, ,, large size, for power .. .. £35, £45, to £60.	

COMBINED MILLS for CRUSHING AND PUGGING CLAY.

Size.	Power required.	Price.
		£ s. d.
A	2 Horses.	82 0 0
B	5 ,,	95 0 0
C	7 ,,	150 0 0

BRICK-MAKING MACHINES FOR PLASTIC CLAY,

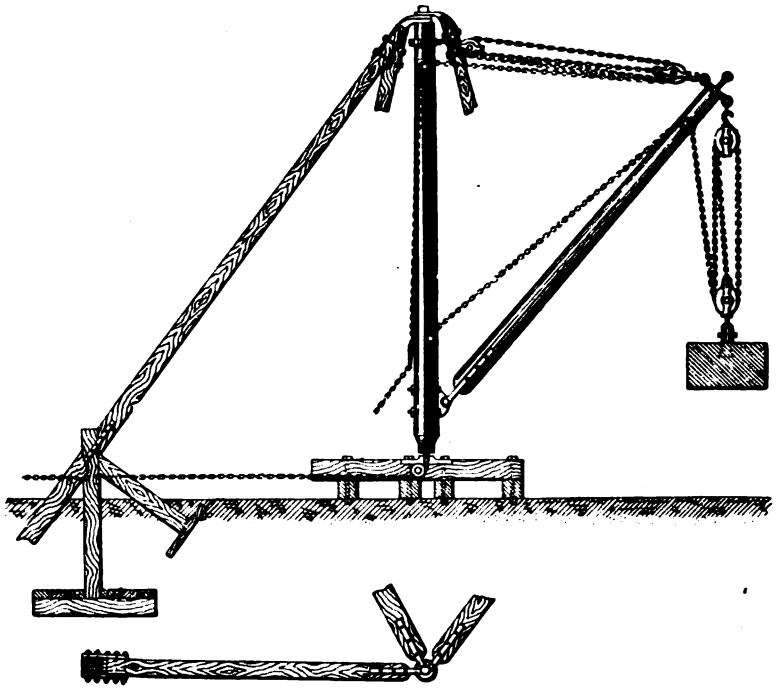
Complete, with every requisite for Crushing, Pugging, Moulding, and Delivering, mounted on Independent Foundation Plate, and including all Fittings.

Size.	Power required.	Average Make a Day.	Approximate Weight.	Price.
No.		Bricks.	tons.	£ s. d.
1	16 Horses.	25,000	10¼	390 0 0
2	10 ,,	16,000	6½	250 0 0
3	8 ,,	12.000	5½	195 0 0
4	6 ,,	10,000	4¾	169 0 0

CHRISTOPHER SEARCH AND CO.,
ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

HAND DERRICK CRANES.

FOR USE IN QUARRIES.



PRICES.

	£
To lift 15 cwt., Jib 25 feet long	30
„ 1 ton „ 30 „	44
„ 1½ „ „ 40 „	55
„ 2 „ „ 40 „	70
„ 3 „ „ 40 „	97

STEAM DERRICK CRANES.

All Steam Cranes have revolving Gear, and an upright Boiler, supported on a suitable Platform. The lengths given below are those usually supplied for Steam Cranes; longer lengths are not advisable for 1½ or 2 tons; 3-ton Cranes have frequently 50-feet Jibs.

PRICES.

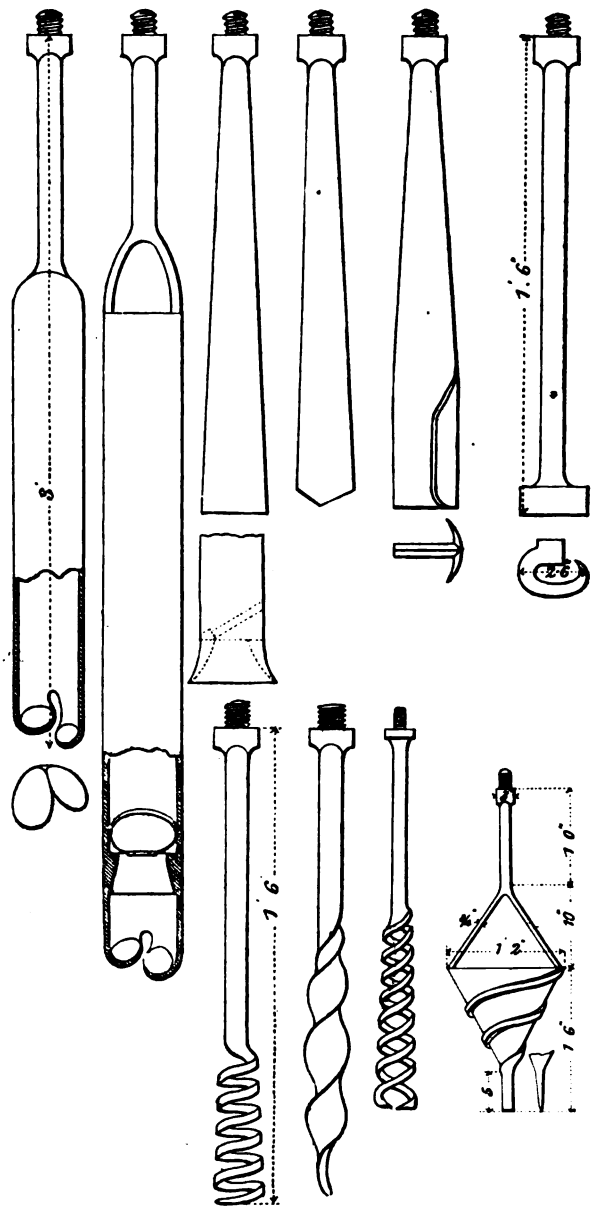
	£
To lift 1½ ton, Jib 40 feet long	176
„ 2 „ „ 40 „	198
„ 3 „ „ 40 „	225

Other, or larger, sizes to Special Estimate.

CHRISTOPHER SEARCH AND CO.,
ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

BORING TOOLS.

Comprising Open Shell Augers, Shoe Shells, Flat Point Chisels, Diamond or Drill Point Chisels, Tee Chisels, Crow's Feet, Spiral Worms, Screw Augers, Spring Hooks, Lifting Dogs, Tillers, Hand Dogs, Boring Rods, short Swivel Rods, Pipe Tongs, Spring Darts, Bell Screws, &c., in all sizes from 1 inch and upwards. These Tools are warranted to be of the very best materials, make, and finish, and are supplied in sets or otherwise.



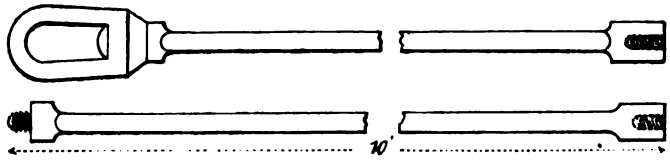
PRICES, AND TOOLS USUALLY SUPPLIED.

SMALL SET, TO BORE TO 45 FEET.

One Spring Hook, one Swivel Rod, eight 5-feet lengths of ¾-inch Rods, one Lifting Dog, two Hand Dogs, one pair of Tillers, one 2-inch Worm Auger, one 2-inch Flat Chisel, one 2-inch Shell Auger and Valve, one 2-inch Clay Auger.

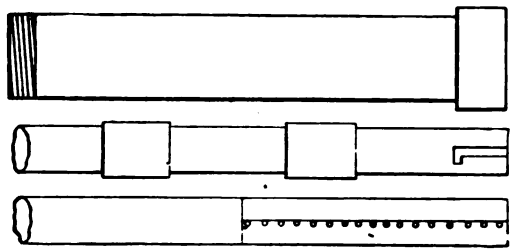
Price complete, £17 10s.

Drawings and Prices of Special Boring and Sinking Tools on application.



CHRISTOPHER SEARCH AND CO.,
ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

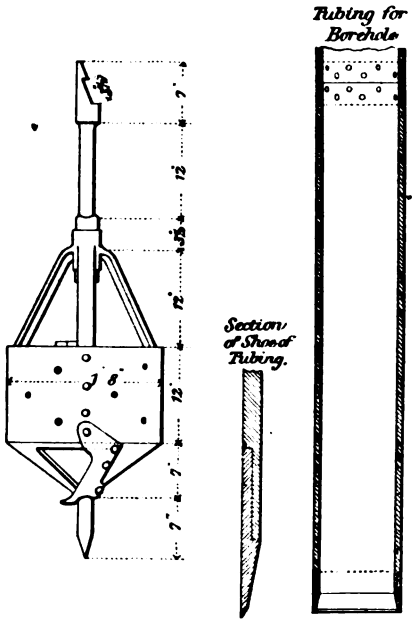
BORING TOOLS.



ORDINARY SET, TO BORE TO 150 FEET.

Comprising a Spring Hook, 30 feet of Rope, a Swivel Rod, an Auger Board, an Auger Clearer, fifteen 10-feet lengths 1-inch Boring Rods, pair of Tillers, Rigger and Carriage, two Hand Dogs, two Lifting Dogs, Worm Auger, Bell Box, 4¼-inch and 3¼-inch T Chisels, 4¼-inch and 3¼-inch Flat Chisels, two each; 4-inch and 3-inch Shells, 4¼-inch and 3¼-inch Clay Auger, Set of Ironwork for Shear Legs, Well Sinker's Windlass.

Price complete, £66 15*s.*



LARGE SET OF TOOLS, FOR BORING TO 800 FEET.

One each, 12½, 11½, 10½, 9½, 8½, 7½, and 6½ inch Augers; one each, same size, Flat Chisels; two each, same size, T and V Chisels; three each, 11½, 10, 9, 8, 7, 6, and 5 inch Shells and Pod Augers; two Spring Hooks; two 30-feet lengths Rope; two Swivel Rods; an Auger Board; an Auger Clearer; Set of Sheave Blocks, Rope Pulls, and Snatch Block; forty 10-feet lengths 1½-inch square Boring Rods, with Screw Joints; forty 10-feet lengths Rods, 1¾-inch square; Strong Rigger and Carriage; two Rod Rests; four Lifting Dogs; Six Hand Dogs; two pairs of Tillers and Screws; two Crow's Feet; three Bell Boxes; two Worm Augers; Set of Ironwork for Shear Legs; Well Sinker's Windlass.

Price complete, £588.

Any of the items enumerated in the above may be omitted, or obtained separately.

Boring Rods in 5-feet lengths, each 21*s.*; in 10-feet lengths, each from 23*s.* to £2 5*s.* Ironwork for Shear Legs, £3 10*s.* Well Sinker's Windlasses from £15 to £45, according to size.

Prices for Mizers, Pickers, Scratchers, Rimers, Riming Springs, Sinkers' Buckets, and all other Sinking and Boring Tools on application.

CHRISTOPHER SEARCH AND CO.,
ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

PARKINS' PATENT SIGNAL BELL.

This Bell is so constructed that it can be worked from any direction. The disc is of malleable cast iron, thereby ensuring durability and strength. There is only one spring attached to the bell, the catch being self acting. This signal is adaptable for Railways, Collieries, Steamboats, Locomotives, &c.; and has now been in use for some time past at many of the largest Collieries, where it has given general satisfaction. Upwards of 600 are now working.

PRICES.

With 6-inch Bell	25*s.*	each.
„ 8 „	32*s.* 6*d.*	„
„ 10 „	45*s.*	„
„ 12 „	55*s.*	„

LARGER SIZES TO ORDER.

SPRINGS.

SMALL STEEL SPIRAL SPRINGS	1*s.*	each.
Orders with not less than half a dozen Bells, gratis.		
LARGE SPRINGS, TO BALANCE WIRE IN SHAFTS	4*s.* 6*d.*	„

ELECTRIC SIGNALS.

	£	*s.*
SEVEN-INCH BELLS, IN PROPER CASE	4	0
RINGING PUSHES FOR DITTO	1	2
BATTERIES OF LARGE SIZE, FROM	0	6

Insulator Wire, Gutta-percha of all sizes, from £9 to £20 a mile.

Estimates of the cost of Electric Signals and Apparatus delivered and fixed, will be forwarded on application, and on receipt of the following particulars: Code of Signals required; Distances; Number of Bells and Pushes; and whether for Engine Plane or Shaft.

ORDINARY PULL SIGNAL BELLS,

VERY STRONG, 11 INCHES DIAMETER, £5; 7 INCHES DIAMETER, £2.

CHRISTOPHER SEARCH AND CO.,

ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

ROPES.

The following formulæ will be found useful in determining upon the size of rope to employ, or in calculating the efficiency of those in use.

To calculate the breaking weight for Ropes in Tons; multiply the square of the circumference in inches by 0·2 for hemp, by 1·5 for iron wire, and by 2·5 for steel wire.

For safe working load allow one-fifth to one-seventh of ultimate strength, according to speed and vibration.

An easy rule for calculating the proof strength of rope is—for hempen rope, square the circumference in inches, and divide by 10; for iron wire rope, square the circumference, and divide by 1·6; and for steel wire rope, square the circumference; which will in each case give the result in tons. Thus a hempen rope 10 inches, an iron wire rope 4 inches, and a steel wire rope 3·16 inches in circumference, will each carry permanently 10 tons.

A sufficiently close approximation to the working load of round wire ropes in shafts is to multiply the weight of the rope a fathom in pounds by 5, which will give the working load in cwts., and for steel wire ropes, multiply by 8. In the working load is included the weight of rope hanging over the pulley.

PRICES.

HEMP.—Best Tarred Russian,	Crab Ropes	42*s.* per cwt.
„	Cordage	42*s.* „
„	Spunyarn	34*s.* „
Best White Russian	„	40*s.* „

	2 inch.	2 to 3 inch.	Over 3 inch.
IRON WIRE.—Round	36*s.*	34*s.*	32*s.* 6*d.* per cwt.
Flat, all sizes			45*s.* „
STEEL WIRE.—Round			60*s.* „
Flat			70*s.* „

Patent Round Steel Ropes from Plough Rope Wire .. .. .. 105*s.*

BEST BEST SHORT LINK CRANE CHAINS, Tested to Admiralty Scale, and made of extra refined Iron, ¼ to 1¼ inch, 26*s.* to 50*s.* per cwt.

SAFETY LINKS.

Ormerod's Patent Safety Link, for the Prevention of Accidents from Over-Winding, is effectual and certain in its action, not liable to get deranged or out of order, and can be applied at a trifling cost. By this apparatus the rope is detached and the cage suspended at one operation, without the addition of steps on the pulley framing, or catches on the cages.

The apparatus consists of a cylinder, wider at the bottom than at the top; this is fixed in the pit frame overhead. To the winding rope are attached the Safety Links. If the cage is over-wound, the blades of the links coming into contact with the narrow part or throat of the cylinder, begin to close at the bottom, at the same time opening out the top, forcing the shackle attached to the winding rope, from its seat into a slot which allows the rope to go free, at the same time it forces the shackle to which the cage is attached out of its seat into a bottom slot, and locks itself. The cage being suspended from the chain, cannot fall back again. To prevent the possibility of the link becoming detached or deranged at any time in the pit, it is locked by a pin being inserted through the plates.

PRICE.

To carry from 2 to 6 Tons .. .. £11 to £16

IMPROVED PIT-HEAD PULLEYS.

These Pulleys are of a superior description, adapted for flat or round wire ropes, and made of all sizes to order. The arms are of wrought iron, and spragged, giving the pulleys a light appearance, and at the same time great strength. The centre is hooped with wrought iron, and the hole for shaft is bored, which gives much greater truth in the rims. The shafts are of wrought iron, turned all over and keyed in. The pedestals are fitted with brass bottom steps and iron tops, carefully bored and turned to the shafts. These pulleys, if required, are furnished with the rims turned up, giving a perfectly true face—a very important consideration where high speeds are run; this gives great steadiness to the rope, and consequently reduces the wear and tear to a minimum.

PRICES FORWARDED ON RECEIPT OF PARTICULARS.

THE PRICES AND WEIGHTS OF ORDINARY PULLEYS WITH WROUGHT-IRON ARMS, FOR EITHER ROUND OR FLAT ROPES, ARE AS FOLLOWS:

	Diameter.	Weight.	Price.
			£ s. £
Round Rope Pulleys ..	6 feet	6½ cwt.	6 10 to 9
	8 „	9¾ „	9 10 „ 12
	10 „	13½ „	13 10 „ 16
	12 „	20 „	18 0 „ 20
			£
Flat Rope Pulleys ..	6 „	Varies	12
	8 „	according	15
	10 „	to width of	20
	12 „	trod, &c.	24

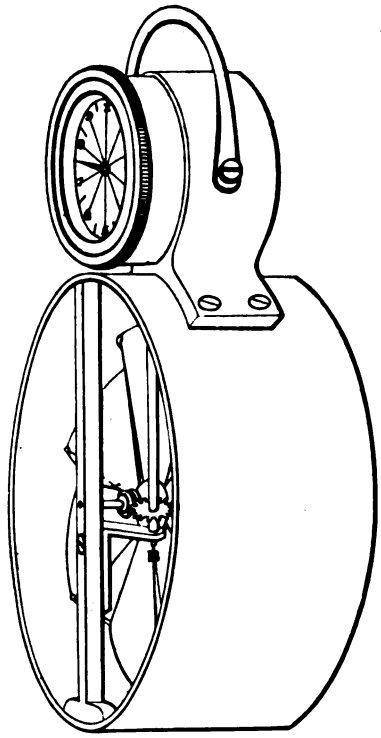
PRICES FOR ROUND ROPE PULLEYS, FITTED WITH GUDGEONS, CARRIAGES, BRASSES, &c., COMPLETE.

For a Working Load not exceeding 5 Tons, about—

Diameter—6 feet.	7 feet.	8 feet.	9 feet.	10 feet.	11 feet.	12 feet.
£25	£28	£33	£38	£43	£52	£65

CHRISTOPHER SEARCH AND CO.,
ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

MINE ANEMOMETERS.



For measuring the velocity of air currents in mines, shafts, or other underground workings, Anemometers composed of a small light fan wheel, whose motion is transmitted to a counter which registers the number of turns, are most certain and convenient for use, though they must previously be tested, or the relation existing between the velocity of the wind and the number of turns of the wings must be accurately determined.

"BIRAM'S ANEMOMETER."

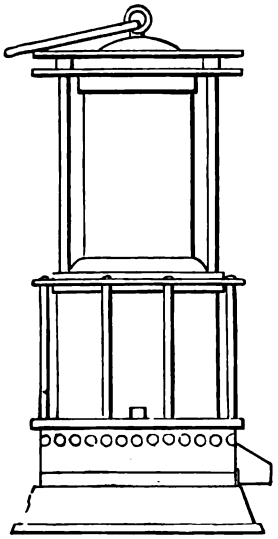
This Anemometer, which is the one most generally used in the coal mines of England, can be recommended with confidence; it self registers the velocity of the air through any passage of a mine in which it is placed, and is a sure detection of any slackening of the current, by neglect of the furnace, or obstruction in the air course, and a complete check against inattention in the furnace man. It is made in four sizes, 2, 4, 6, and 12 inches, is very portable, and is not, with proper care, liable to get out of order. Some of these instruments will continue to revolve in a current as low as 30 feet a minute, but with most of them a velocity of about 50 feet is required. The inaccuracy of each Anemometer at different velocities is carefully tested, and a certificate is issued with each instrument showing the amount of air in feet to be added or deducted, being the result of experiment with each Anemometer separately.

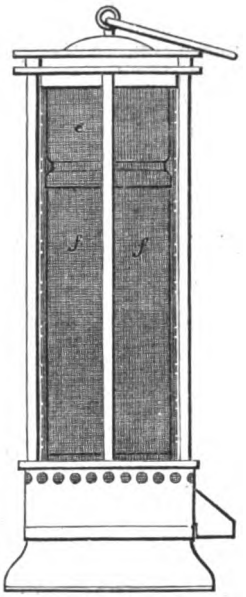
PRICE.

				£	s.	d.
No. A.	12 in.	diameter,	reading up to 10,000,000 feet	4	4	0
	6	„	„ 1000 feet	3	3	0
	6	„	„ 1000 „ with disconnecting motion	3	13	6
B.	4	„	„ 100 „	2	10	0
C.	4	„	new, reading up to 10,000,000 feet	4	4	0
D.	2	„	reading up to 100 feet	2	0	0
E.	2	„	new, reading up to 10,000,000 feet	3	15	0

CHRISTOPHER SEARCH AND CO.,
ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

SAFETY LAMPS.





The great requisites in all Lamps to be used in *Fiery* Mines are, safety from explosion, simplicity of construction, to give a good light, and that it shall be altogether impossible for the miner to expose the flame, or to relight it in the mine. All these advantages are possessed by the Lamps supplied by SEARCH AND CO., the working of which is of the most simple character.

These Lamps are perfectly safe, as it is impossible to expose the flame; they give double the light of the ordinary safety lamp at half the cost; they make no smoke or soot; are of the simplest construction; cannot get out of order; and require no picker.

Lamps are also manufactured by us for use as Shaft, Stable, or Pit Lamps, for which, as they give a strong and steady light, they are admirably suited.

PRICES.

	At per Dozen.
Ordinary Davy Lamps	96*s.*, 48*s.*
Protector, Davy, Stephenson, or Clanny Lamps	150*s.*
,, Plate-Glass Sides and Fronts, Electro-plated Reflector, No. 1, one jet	66*s.*
,, Reflector, No. 2, one jet	78*s.*
,, ,, No. 3, two jets	90*s.*
,, Japanned Shaft, Stable, or Pit Lamps, three jets	138*s.*
,, Globe Hand Lamps, one jet, Japanned	78*s.*
,, ,, ,, ,, Brass	90*s.*
,, 7-inch Globe Lamps, two jets, Japanned	90*s.*
,, ,, ,, ,, Brass	150*s.*
,, 9-inch ,, three jets, Japanned	117*s.*
,, ,, ,, ,, Brass	189*s.*
Prepared Colzalene, 2*s.* per gallon.	
Doria's Patent Safety Lamp	78*s.*

CHRISTOPHER SEARCH AND CO.,

ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

MINERS' DIALS.

HEDLEY DIALS.

5-inch Hedley Dial .. .. £9 15s.
5 „ „ with arc .. .. £11 15s.
5 „ „ with rack and pinion, vernier, and arc .. .. £13 15s.
Extra set of legs, one set of joints, and cup for lamp .. .. .. £2 2s.

DUMPY LEVELS.

10 inch, 12 inch, and 14 inch, £11 10s., £12 10s., and £14.
Compass, 30s. extra.

TELESCOPE DUMPY LEVELS,

For Mine Levelling and Draining. 8 inch and 9 inch, £6 10s. and £7 10s.

WATER GAUGES.

Water Gauges, each .. .. 9s. 6d.
„ with screw .. .. 16s.
„ with level and screw £1

CLINOMETERS.

Rule Clinometer, with levels, compass, sights, and jointed staff complete .. .. £3 5s.
Clinometer, with sights and compass, and useful tables on side .. £1 18s.
„ without sights .. .. £1 5s.
Best Plumb Bobs from 2s. to 5s.

CROSS STAFFS.

Plain Cross Staffs, 6s. 6d. to 12s. 6d. Ditto, with compass, 12s. 6d. to 25s.
Ditto, with compass and vernier, 42s. Optical Squares, 21s.

PIT LEVELLING STAFFS.

9-feet Sopwith Staff, to close down to 3 feet 6 inches .. .. .. £1 15s.
6 „ „ „ 2 „ 6 „ .. .. .. £1 12s.

DIALLING CHAINS, IRON,

With 10 links, brass each end .. .. 15s. 6d.
Standard Chains, all links brazed .. .. 50s., 75s., 55s.

ARROWS.

Set of 10. Iron, 1s. 6d.; steel, 2s.

SURVEYING POLES.

6 feet, 3s. 8 feet, 3s. 3d. 10 feet, 4s. each.

OFFSET RODS.

Ten links, ferruled each end .. .. 4s. 6d.

SCREW RAIL-BENDER OR "JIM CROW."

This is a very useful Tool for Platelayers, Railway Contractors, &c. It is made of best hammered scrap iron, and has a machine-cut square thread screw. Weight about 90 lb.

Price, complete £4

PATENT "DUPLEX" LEVER PUNCHES.

PRICES.

		£	s.
OPEN-MOUTH PUNCHES.			
No. 1.	To punch ½ in. through ½-in. Plate. Weight 25 lb.	6	15
2.	,, ¾ in. ,, ¾-in. ,, ,, 42 lb.	8	10
3.	,, ¼ in. ,, ¼-in. ,, ,, 89 lb.	11	5
CLOSE-MOUTH PUNCHES.			
No. 1.	To punch 1½-in. hole through ¾-in. Iron Rails	27	0
2.	,, 1¼-in. ,, ½-in. Steel		

These Prices include one *round* punch and die of the largest size. Any other shape charged extra.

PATENT HYDRAULIC PUNCHING BEARS.

These Machines can be fitted in any position, and can be adapted to work either by hand or power. With the No. 1. Machine a man can punch three holes a minute. The space from centre of punch to back of gap for open mouth is 1¾ inch.

PRICES.

		£	s.
OPEN MOUTH.			
No. 1.	To punch holes ¾ in. through ½-in. Plate. Weight 64 lb.	10	0
2.	,, 1 in. ,, ¾-in. ,, ,, 120 lb.	15	0
3.	,, 1¼ in. ,, 1-in. ,, ,, 320 lb.	26	0
4.	For 1-in. Steel Rails.		
CLOSE MOUTH.			
No. 1.	To punch holes ¾ in. through ½-in. Plate. Weight 80 lb.	14	0
2.	,, 1 in. ,, ¾-in. ,, ,, 150 lb.	17	10
3.	,, 1¼ in. ,, 1-in. ,, ,, 250 lb.	26	0
4.	For 1-in. Steel Rails .. .. ,, 350 lb.	38	0

EXTRA PUNCH AND DIE, IF SAME SIZE AS IN BEAR.

Round .. .. 10*s.* a pair.
Oval or Square .. .. 20*s.* ,,

HOISTING CRABS.

SIZES AND PRICES.

		Without Brake. £	s.	d.	With Brake. £	s.	d.
SINGLE PURCHASE.							
No. 1.	To lift 1 ton, with 1 to 2 sheave pulley blocks	3	0	0	4	2	6
2.	,, 1½ ton ,, ,, ...	3	7	6	4	12	6
3.	,, 2 ,, ,, ,, ...	4	5	6	5	10	0
4.	,, 3 ,, ,, ,, ...	5	0	0	6	10	0
5.	,, 4 ,, ,, ,, ...	6	5	0	7	15	0
6.	,, 6 ,, ,, ,, ...	7	5	0	8	15	0
	If Brass Bushed, 25*s.* extra.						
DOUBLE PURCHASE.							
No. 10.	To lift 2 tons, with 1 and 2 sheave pulley blocks	5	5	0	6	10	0
11.	,, 3 ,, ,, ,, ...	6	0	0	7	10	0
12.	,, 4 ,, ,, ,, ...	7	7	6	8	17	6
13.	,, 6 ,, ,, ,, ...	8	5	0	9	17	6
14.	,, 8 ,, ,, ,, ...	10	0	0	12	0	0
15.	,, 10 ,, ,, ,, ...	13	12	0	15	15	0
16.	,, 12 ,, ,, ,, ...	17	5	0	19	10	0
17.	,, 16 ,, ,, ,, ...	20	0	0	23	10	0
	If Brass Bushed, Nos. 10 to 12	1	7	6	extra.		
	,, ,, 13 and 14	1	15	0	,,		
	,, ,, 15 to 17	2	0	0	,,		

Any of these Crabs can be made with wrought-iron sides if required.

CHRISTOPHER SEARCH AND CO.,
ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

WROUGHT-IRON PULLEY BLOCKS.

LONDON PATTERN.

In this arrangement of Block, each plate forms a support for the centre shaft, besides protecting the Pulley from damage. The eye is supplied with the smallest Block of each pair ordered. The actual width of the grooves is from $\frac{1}{16}$ to $\frac{1}{8}$ more than List, so that 16 × 3¼ is really 16 × 3⅜, and so on, to allow for new rope being larger. The Blocks have turned shafts, bright pulleys, and are bored. The 10 × 2 inch Pulley Blocks and above are made with rings instead of hooks.

GIN BLOCKS OR RUBBISH WHEELS.

PRICES.

Diameter of Pulley	3½	4⅝	6	7	8	9	10	11	12	14	16	18	20	22
Width of Groove	½	⅝	1	1¼	1	1	1	1	1	1¼	1½	1½	1½	1½
Price	5/9	6/3	7/0	7/9	8/6	9/3	10/0	11/0	12/0	13/0	16/6	21/0	24/0	27/6

PULLEY BLOCKS.

PRICES.

Diameter of Sheave.	Width of Groove.	Will take Chain Diameter.	Snatch Block.	1-Sheave Block.	2-Sheave Block.	3-Sheave Block.	4-Sheave Block.	Brass Sheave Blocks, each Sheave extra.
ins. 2½	⅜	..	6/0	4/0	5/6	7/0	8/6	0/9
3½	½	..	6/0	4/6	7/0	8/6	10/0	1/6
4	⅝	..	7/0	5/9	8/6	10/6	12/6	2/0
4¾	⅝	5/16	8/6	7/6	11/0	14/0	18/6	3/0
5	⅞	¼	11/6	10/0	15/6	19/6	25/6	4/6
6	1	7/16	13/6	11/6	17/0	21/6	28/6	6/3
7	1⅛	⅜	16/6	14/0	24/6	30/6	46/0	7/9
8	1⅜	9/16	21/6	19/0	35/6	48/6	63/0	11/6
9	1⅝	½	32/0	30/0	50/0	70/0	92/6	15/3
10	2	11/16	60/0	52/6	98/0	127/0	157/0	21/6
11	2⅛	⅝	80/0	72/0	124/0	157/0	190/0	
12	2⅜	13/16	110/0	98/0	144/0	190/0	222/6	
14	2⅞	⅞	140/0	110/0	170/0	222/6	280/0	
15	3	15/16	170/0	130/0	203/0	262/0	352/0	
16	3⅛	1	210/0	164/0	242/0	310/0	400/0	

CHRISTOPHER SEARCH AND CO.,
ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

SELF-SUSTAINING ROPE PULLEY BLOCKS.

HEWITT AND GOFF'S PATENT.

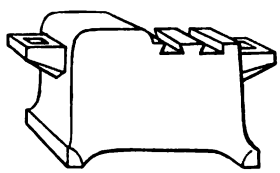
These Blocks are suitable for Miners, Builders, Quarrymen, and Well Sinkers, and are valuable in all cases where large weights are to be speedily raised and left suspended. The advantages possessed by these Blocks are—The Weight can be sustained at any desired point. The Block is self sustaining, the Eccentric Brake being put in and out of action by moving the hand-rope to the right or left, or by pulling the rope upwards, and so causing it to touch the Guides. Being worked by a rope, the motion is quicker and steadier than that of any Chain Block. The extreme simplicity of its action renders it absolutely impossible to get out of order, as is often the case with Chain Blocks from the stretching of a link in the chain. To lower the Blocks pull the hand-rope an inch or two. This will release the Brake, and allow the rope to run freely through the hand.

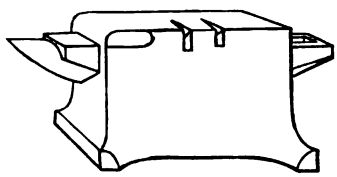
PARTICULARS AND PRICES.

Number of Sheaves in Pair of Blocks.	Sufficient Best Rope for a	Diameter of Sheave Width of Groove ..	Inches. 2½ ⅝	Inches. 3½ ¾	Inches. 4 ⅞	Inches. 4½ 1	Inches. 5 1⅛	Inches. 6 1
			s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1 and 1 Sheave ..	10-feet Lift		18 9	20 0	23 9	28 6	36 6	41 6
,, ..	12 ,, ...		19 6	21 0	24 9	29 6	38 0	43 6
,, ..	15 ,, ...		20 0	22 6	26 0	31 6	41 0	46 0
,, ..	20 ,, ...		21 6	24 6	28 6	34 0	45 6	51 0
1 and 2 Sheave ..	10-feet Lift		21 6	24 9	28 6	34 6	40 6	51 0
,, ..	12 ,, ...		22 6	25 9	29 6	36 0	43 0	53 9
,, ..	15 ,, ...		23 6	27 6	31 6	38 6	46 6	57 9
,, ..	20 ,, ...		25 0	29 9	34 6	42 0	52 6	64 6
2 and 2 Sheave ..	10-feet Lift		25 0	29 6	33 0	41 6	56 6	61 6
,, ..	12 ,, ...		25 6	30 6	34 6	43 6	59 6	66 0
,, ..	15 ,, ...		26 9	32 6	36 9	46 6	63 9	71 0
,, ..	20 ,, ...		29 0	35 9	40 6	48 9	71 0	79 6
2 and 3 Sheave ..	10-feet Lift		28 6	32 9	37 6	46 6	63 0	69 6
,, ..	12 ,, ...		30 0	34 6	39 0	48 6	66 6	73 6
,, ..	15 ,, ...		30 9	36 6	41 9	52 0	71 9	79 6
,, ..	20 ,, ...		33 6	40 6	46 0	57 9	79 0	89 6
3 and 3 Sheave ..	10-feet Lift		31 6	36 6	41 9	52 0	70 0	77 6
,, ..	12 ,, ...		32 9	38 0	43 9	54 9	74 0	82 6
,, ..	15 ,, ...		34 6	40 9	46 9	58 9	80 0	89 6
,, ..	20 ,, ...		37 6	45 0	52 0	65 6	90 9	101 0
3 and 4 Sheave ..	10-feet Lift		35 0	39 6	45 6	59 0	81 0	90 0
,, ..	12 ,, ...		36 0	41 6	48 0	62 0	85 9	95 6
,, ..	15 ,, ...		38 0	44 6	51 6	66 6	92 9	103 6
,, ..	20 ,, ...		41 9	49 6	57 3	74 0	104 6	116 9
4 and 4 Sheave ..	10-feet Lift		38 6	43 6	51 6	66 0	90 0	101 0
,, ..	12 ,, ...		40 0	45 9	54 0	69 6	95 0	107 0
,, ..	15 ,, ...		42 6	49 6	58 0	74 6	103 0	116 0
,, ..	20 ,, ...		46 0	55 0	65 0	83 0	116 0	131 0

VICES.

Portable Vices with Iron Benches									50*s.* each.
Best Bright Staple or Flour Vices									4½*d.* a lb.
„ Black „ „									4*d.* a lb.
If Patent Solid Boxes and under 30 lb., 1*d.* a lb. extra.									
Parallel Vices with Steel Jaws. 6-inch Jaws									£4 15*s.*
„ „ „ 8-inch „									£6 15*s.*
Small Bench Vices									9*d.* a lb.
Vice Boxes and Pins									9*d.* „
	4	4¼	4½	4¾	5	5¼	5½	5¾	6 inches.
Hand Vices	22*s.*	24*s.*	28*s.*	32*s.*	36*s.*	40*s.*	44*s.*	48*s.*	52*s.* a dozen.





ANVILS.

	Best Best, Warranted, with tied-in Bicks and Ends.	Second Best Ditto.	Common Bright Steeled Face.	Common Iron Anvils, Bright Face.
	per cwt.	per cwt.	per cwt.	per cwt.
Smith's Anvil, ordinary shape ..	27/0	25/0	23/6	20/6
„ „ London	27/0	25/0	23/6	20/6
Double Arched Anvil	27/0	25/0	23/6	20/6
Round Bick Farrier's Anvil ..	27/0	25/0	23/6	20/6
Double Bick Anvil	21/0	26/0	24/6	21/6
Boiler Maker's Anvil	29/6			
Soho Anvil	29/6	Best Quality only.		
Portable Anvil	33/6			

DENAYROUZE'S AËROPHORE.

This Apparatus, which is largely used in France and Germany, is constructed for the purpose of enabling the Miner to penetrate at once and to a long distance workings which are foul with choke-damp, and to remain there a considerable time, carrying with him his lamp, and having the free use of his hands and arms, and without any risk or danger. Prices and full descriptive particulars of this apparatus can be had on application.

CHRISTOPHER SEARCH AND CO.,

ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

Crucible Cast-Steel Tram and Corve Wheels, Pedestals, and Axles.

These Wheels are from one-half to one-third lighter than cast iron. They cannot be broken while working, even with rough usage, and will wear twelve times as long as cast iron, thus saving animal and steam power, and reducing wear and tear immensely. The arms of these Wheels are constructed upon the curved principle, consequently the shrinkage or cooling of the castings is not interfered with, thus securing the greatest advantages of this very strong material. These Wheels are fitted upon the Axles by Hadfield's Patent Process, the advantages of which are, that the Wheels being forced upon a taper square-ended Axle, by machinery, and then riveted, the machine securing truth, it is impossible that they can come loose or get within gauge. They are very cheaply fitted on, and run very true.

PRICES.

Crucible Cast-Steel Wheels .. .. 36*s.* per cwt.
„ „ Pedestals .. .. 46*s.* „
Bessemer Steel Axles (plain round) .. .. 25*s.* „

PRICES FOR FITTING, ON HADFIELD'S PATENT PROCESS.

Wheels.	Outside Bearings.	Inside Bearings.	Wheels.	Outside Bearings.	Inside Bearings.
inches.	the set.	the set.	inches.	the set.	the set.
14	7/6	6/0	10	7/6	5/0
13	7/6	5/9	9	7/6	4/9
12	7/6	5/6	8	7/0	4/6
11	7/6	5/3	7	7/0	4/6

IMPROVED SAW BENCHES.

These Benches have planed tops, loose-and-fast pulleys, improved fence, adjustable sliding plate, and mounted on a strong cast-iron frame.

No.	Size of Bench.	Saw.	Extra for Striking Gear.	Diagonal Fence.	Weight.	Pulleys.	Price.	Remarks.
	ft. in. ft. in.	inches.			cwts.		£ s.	
0	3 6 by 2 0	24	20/0	40/0	4¼	8 by 3	12 0	
1	4 0 2 0	30	22/6	40/0	5½	9 4	13 10	
2	5 0 2 6	38	22/6	45/0	9¼	9¾ 5	22 0	
3	6 0 2 9	42	25/0	48/0	12	12 5	26 0	
4	7 0 3 3	54	40/0	52/0	27	16 5½	48 0	
0A	3 6 2 0	24	..	..	5½	8 3	20 0	Rise and Falling Spindles.
1B	4 0 2 3	30	..	..	9	9 4	25 0	
2C	5 0 2 6	38	..	..	12	9¾ 5	32 0	

CHRISTOPHER SEARCH AND CO.,

ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

BURY'S PATENT INTERCHANGEABLE SOLID CAST-STEEL PICKS.

These Picks are made of a superior quality of cast steel, and will attack the hardest substance without yielding. They wear longer and work more effectively than the ordinary iron Pick; never require re-steeling; and are guaranteed to do five times the work of an iron Pick without need of re-sharpening. The shafts and blades being interchangeable, only one shaft is required for any number of tools; and as they can be attached to, and detached from, each other instantly, this will be found a great advantage to road and railway contractors, miners, and others, who have to carry their tools some distance to their work. Upwards of 100,000 have already been sold, and are giving universal satisfaction. Each tool is stamped with *a lion*, and the words "Bury's and Co., Sheffield."

PRICES.

Miners' and Stone Picks, Hoop Pattern, Solid Steel Blades:

No.	Weight of Blades and Hoops.	Price.
0	2 lb. each	1*s.* 9*d.* each.
1	2½ ,,	2*s.* 0*d.* ,,
2	3 ,,	2*s.* 3*d.* ,,
3	3½ ,,	2*s.* 6*d.* ,,
4	4 ,,	3*s.* 0*d.* ,,
5	4½ ,,	3*s.* 3*d.* ,,
6	5 ,,	3*s.* 6*d.* ,,
7	5½ ,,	3*s.* 9*d.* ,,
8	6 ,,	4*s.* 3*d.* ,,

Stone and Quarry Picks, 7 lb. and upwards .. .. 8*d.* a lb.

Shafts fitted with hoop, 1*s.* 9*d.* each.

Railway, Navvy, and Road Picks, hoop pattern, solid steel blades. Made to any pattern or shape .. .. 8*d.* ,,

Railway Beaters .. .. 9*d.* ,,

Shafts fitted with hoop, 2*s.* each.

PICKS.

Double point, or point and chisel, solid eyes: Steeled bright point, according to quality .. .. 30*s.* to 34*s.* per cwt.

Best steeled, polished ditto, japanned or best self colour .. .. 38*s.* per cwt.

Cast steel, all bright, blued, or japanned .. .. 45*s.* ,,

Stone and Quarry Hammers, good quality and medium sizes .. .. 34*s.* ,,

Gold Diggers' Driving Picks, point or chisel ends, 2¾ lb. to 3¾ lb. each .. .. 15*s.* a dozen.

Ditto ditto solid cast-steel ends, best finish .. .. 22*s.* ,,

American pattern, solid cast steel, fine curved Mining Picks, best finish:

4½	5	5½	6	6½	7	7½	8 lb. each.
34*s.* 6*d.*	37*s.*	39*s.*	41*s.*	42*s.* 6*d.*	44*s.* 9*d.*	49*s.* 6*d.*	54*s.* 8*d.* a dozen.

Cornish or Australian Miners' Picks:

4¼	4½	4¾	5¼	5½	5¾ lb. each.
19*s.*	20*s.* 6*d.*	22*s.*	23*s.* 6*d.*	25*s.*	26*s.* a dozen.

Solid cast-steel ends, 9*s.* a dozen extra.

CHRISTOPHER SEARCH AND CO.,

ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

PICKS AND HAMMERS.

Platelayers' Beating Picks	41*s.* 0*d.* per cwt.
Clay Picks	41*s.* 0*d.* ,,
Single-end Picks	26*s.* 6*d.* ,,
,, well steeled	35*s.* 6*d.* ,,
Keying Hammers, well steeled	48*s.* 0*d.* ,,

Miners' Jumpers, chisel ends	25*s.* 0*d.* a dozen.
Miners' Drills ,,	21*s.* 0*d.* ,,

Handled Coal Hammers:

1½	2	2½	3	3½	4 lb. each.
10*s.* 6*d.*	12*s.*	14*s.*	17*s.*	20*s.*	22*s.* a dozen.

Nailing Hammers, chequered face	6½*d.* a lb.
Pin Mauls	5½*d.* ,,

WHEELBARROWS—WROUGHT-IRON.

ARRANGED EXPRESSLY FOR EXPORTATION.

These Barrows are of the most simple construction and greatest strength; the frames are so made that 60 may be packed in the space required for 5 on the old principle, and they can be put together in a few minutes. The bodies being all of the same size, several may be ordered for each frame.

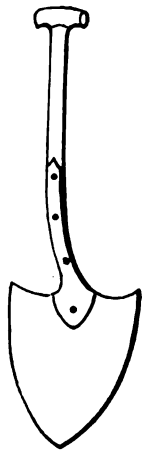
PRICES ON APPLICATION.

BARROW WHEELS—CAST-IRON .. .. .. £15 a Ton.

Cast-Iron Swages	14*s.* 6*d.* per cwt.
" Water Boshes	14*s.* 6*d.* ,,
Sledge Hammers	50*s.* 0*d.* ,,
Water Tuyere Iron	1*s.* 4*d.* an inch.
Bright Steel Grease-Knives	12*s.* 6*d.* a dozen.

CHRISTOPHER SEARCH AND CO.,

ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.



SHOVELS.

CORNISH, DEVONSHIRE, OR IRISH MINERS' SOCKET SHOVELS.

No. 1.	No. 2.	No. 3.	No. 4.	No. 5.
10 in. by 12 in.	10½ in. by 12½ in.	11 in. by 13 in.	11½ in. by 13½ in.	12 in. by 14 in.
15*s.*	16*s.*	17*s.*	18*s.*	19*s.* a dozen.

If Steeled, 4*s.* a dozen extra.

BEST CAST-STEEL SQUARE OR GRAVEL SHOVELS.

Extra long Socket, ¾ Bright, Riveted Eye Handles.

No. 1.	No. 2.	No. 3.	No. 4.
9½ in. by 12 in.	10 in. by 12½ in.	10½ in. by 13 in.	11 in. by 13½ in.
64*s.*	66*s.*	68*s.*	70*s.* a dozen.

BEST CAST STEEL ALL THROUGH CENTRE STRAP, SQUARE OR ROUND NOSED SHOVELS.—¾ Bright.

No. 1.	No. 2.	No. 3.	No. 4.
9½ in. by 12 in.	10 in. by 12½ in.	10½ in. by 13 in.	11 in. by 13½ in.
74*s.*	76*s.*	78*s.*	80*s.* a dozen.

SOCKET COAL SCOOPS OR FIRING SHOVELS.—Riveted D Handles.

No. 1.	No. 2.	No. 3.	No. 4.
10 in. by 14½ in.	10½ in. by 15 in.	10½ in. by 15½ in.	11 in. by 16 in.
60*s.*	64*s.*	66*s.*	70*s.* a dozen.

IMPROVED ALL STEEL SQUARE-MOUTH SHOVELS.—Crutch or Eye Handles.

No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.
9½ in. by 12 in.	10 in. by 12½ in.	10½ in. by 13 in.	11 in. by 13½ in.	11½ in. by 14 in.	12 in. by 14½ in.
36*s.*	38*s.*	40*s.*	42*s.*	44*s.*	47*s.* a dozen.

Riveted Eye Handles, 2*s.* a dozen extra.
,, ,, Ground Half Bright, 6*s.* a dozen extra.

IMPROVED ALL STEEL SQUARE-MOUTH FIRING SHOVELS.

3 ft. 6 in. Crutch Handles.

No. 6.	No. 7.	No. 8.	No. 9.	No. 10.
12 in. by 14½ in.	12½ in. by 15 in.	13 in. by 15½ in.	13½ in. by 16 in.	14 in. by 16½ in.
51*s.*	54*s.*	57*s.*	60*s.*	63*s.* a dozen.

IMPROVED ALL STEEL ROUND-MOUTH SHOVELS.—Crutch Handles.

No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.
10 in. by 12 in.	10½ in. by 12½ in.	11 in. by 13 in.	11½ in. by 13½ in.	12 in. by 14 in.	12½ in. by 14½ in.
38*s.*	40*s.*	42*s.*	44*s.*	46*s.*	49*s.* a dozen.

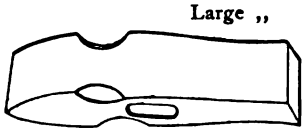
Long Knob Handles, Ground Half Bright, 6*s.* a dozen extra.

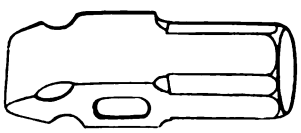
SINKERS' ROUND-NOSED SHOVELS.—2-feet Handles.

No. 1.	No. 2.	No. 3.	No. 4.	No. 5.
10 in. by 12 in.	10½ in. by 12½ in.	11 in. by 13 in.	11½ in. by 13½ in.	12 in. by 14 in.
32*s.*	34*s.*	36*s.*	38*s.*	40*s.* a dozen.

COKE SCREENS.

Small size .. .. 94*s.* a dozen.
Large ,, ... 100*s.* ,,





SUNDRIES.

Stone Splitting Wedges, in Sets, Steeled and Ground..	28*s.* per cwt.
Smiths' Sledge Hammers, Bright Face	33*s.* ,,
,, ,, Double Bright Face	36*s.* ,,
Smiths' Hand Hammers, Bright Face	35*s.* ,,
Wrought-Iron Barrow Wheels	36*s.* ,,
Grindstone Spindles	38*s.* ,,
Lead Ladles	52*s.* ,,

SHAFT OR WELL SINKING TOOLS.

Solid Steel Drills, ready finished, about .. .. 65*s.* per cwt.

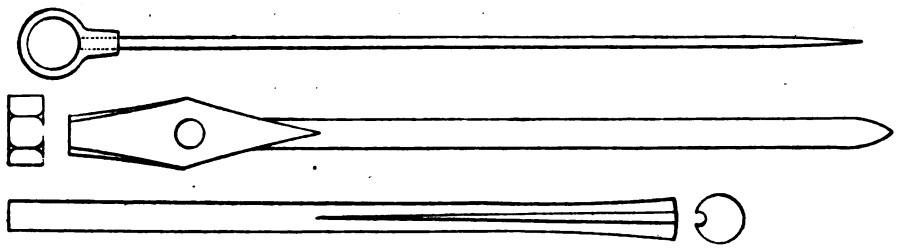
Sinking Drill Steel, in Bars, octagon, any size:

1 inch, 1⅛ inch, 1¼ inch, 1⅜ inch, about .. .. 55*s.* per cwt.

Skewers and Prickers:

2 ft.	2 ft. 3 in.	2 ft. 6 in.	3 ft.	3 ft. 6 in.	4 ft.
3*s.* 6*d.*	3*s.* 10*d.*	4*s.* 3*d.*	4*s.* 6*d.*	5*s.* 3*d.*	6*s.* 6*d.*

Composition Rammers of all kinds .. .. 1*s.* 8*d.* per lb.



PATENT TUYERE.

This Patent Tuyere, manufactured by Messrs. Thwaites and Carbutt, does not require any water jacket, and is suitable for all kinds of Smith's work.

PRICES.

Patent Tuyere, with four spare Blast Grids .. .. 39*s.* each.

Spare Blast Grids for Patent Tuyere .. .. 1*s.* 6*d.* each.

CART AND WAGON GREASE, £14 to £20 A TON.

TIMBER.

Squared Norway, 6 to 10 inch side .. .. 38*s.* a load calliper.

„ Mining ditto, 5 to 8 inch quarter girth .. .. .. 47*s.* „ string.

Round R ditto, 4 to 6 inch girth .. .. 40*s.* „ „

Brattice Cloth, 7*d.* to 10*d.* a yard, according to quality.

Waterproof Blasting Bags, from 7*s.* 6*d.* a dozen, according to size.

Prices of Cast or Wrought Iron Puncheons or Props on application.

NAILS.

	12 to 7	6	5	4	3½	3	2½	2	1½	1 inch.	
	s. *d.*	*s.* *d.*	*s.* *d.*	*s.* *d.*	*s.* *d.*	*s.* *d.*	*s.* *d.*	*s.* *d.*	*s.* *d.*	*s.* *d.*	
Wrot. Spikes and Rose..	19 6	20 0	22 0	24 0	25 6	27 6	29 6	31 6	38 0	..	per cwt.
Wrot. Fence	..	..	..	25 0	26 6	28 6	..	..	..	..	„
Best Csk. Clout	..	..	..	28 0	28 6	29 0	30 0	35 6	40 0	48 0	„
Patent Pressed	..	23 0	23 0	24 0	25 0	26 6	27 6	29 6	33 0	..	„
Cut Clasp and Rose ..	..	17 0	17 0	17 0	17 0	17 0	17 6	18 0	19 0	22 0	„
	$3\frac{1}{2}$ $4 \times \frac{1}{8}$			$3\frac{1}{2}$ $4 \times \frac{7}{16}$			3 $3\frac{1}{2} \times \frac{3}{8}$			$3 \times \frac{3}{16}$	
Brobs	19*s.*			20*s.*			23*s.*			27*s.*	„

CHRISTOPHER SEARCH AND CO.,

ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.

POWDER AND FUSES.

Blasting Powder, of good quality	From 38*s.* per cwt.
Curtis and Harvey's [E S M] Powder	£5 ,,
Dynamite	£10 ,,
Lithofracteur	£8 15*s.* ,,

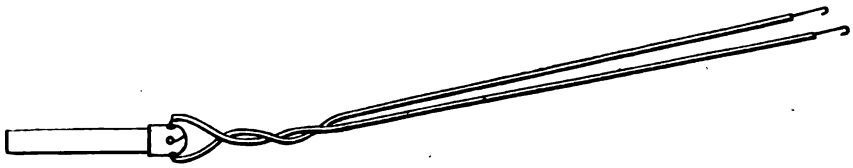
GUNPOWDER DETONATORS.

When fired by means of these Detonators the strength of a charge of Gunpowder is quadrupled.

ANDRÉ DETONATORS, the box of 100	£1
SPECIAL EXTRA STRONG DETONATORS, for exploding charges of Gunpowder from one hundred-weight and upwards	5*s.* to 21*s.* each.
DETONATORS for Dynamite or Lithofracteur, warranted	42*s.* a thousand.

FUSES.

FOR CONVEYING FIRE TO THE CHARGE IN BLASTING ROCKS, &c.



BRAIN'S HIGH-TENSION FUSES.

These Fuses are specially adapted for exploding Dynamite by means of a Siemens' Dynamo-Electric Machine, and as many as 100 can be fired simultaneously.

PRICE.

6*s.* a Dozen, fitted with Detonators and 3-feet Wires.

Dynamo-Electric Machines	£25 each.
Magneto-Electric Exploders and Frictional Machines	From £8 8*s.*

Cables of insulated Wire, for connecting the Machine with the Fuses, vary in price according to the nature of the work.

ELECTRIC BLASTING STICKS, 12*s.* 6*d.* a hundred, fitted with Detonators and 3-feet Wires.
,, ,, with André's Gunpowder Detonators, and Wires, 25*s.* a hundred.

BICKFORD'S PATENT SAFETY FUSES.

		The Coil of 24 feet.
No. 2.	For use in dry ground	4*d.*
3.	*White*, for use in dry and close places	4*d.*
4.	*Red*, for use in very damp and close places	4½*d.*
6.	*Thread Sump*, for use in wet ground	5*d.*
8.	*Tape Sump*, for use in wet ground	6½*d.*
10.	*Treble Countered*, for use in very wet ground, and will bear rough treatment	7½*d.*
12.	*Small Gutta-percha*, for use in very wet ground, or in water	10*d.*
22.	*Treble Wove*, a very superior Fuse, adapted to almost every mining requirement	6*d.*
24.	*White Double Tape*, for use in very wet and close places, and for exportation into hot climates	9*d.*

Drawings and information of the most advanced and economical practice in every variety of Blasting Operations furnished on application.

CHRISTOPHER SEARCH AND CO.,
ENGINEERS, 16, CRAVEN STREET, CHARING CROSS, LONDON.